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Productivity: A Selected, Annotated Bibliography, 1979-82

U.S. Department of Labor
Bureau of Labor Statistics
December 1984

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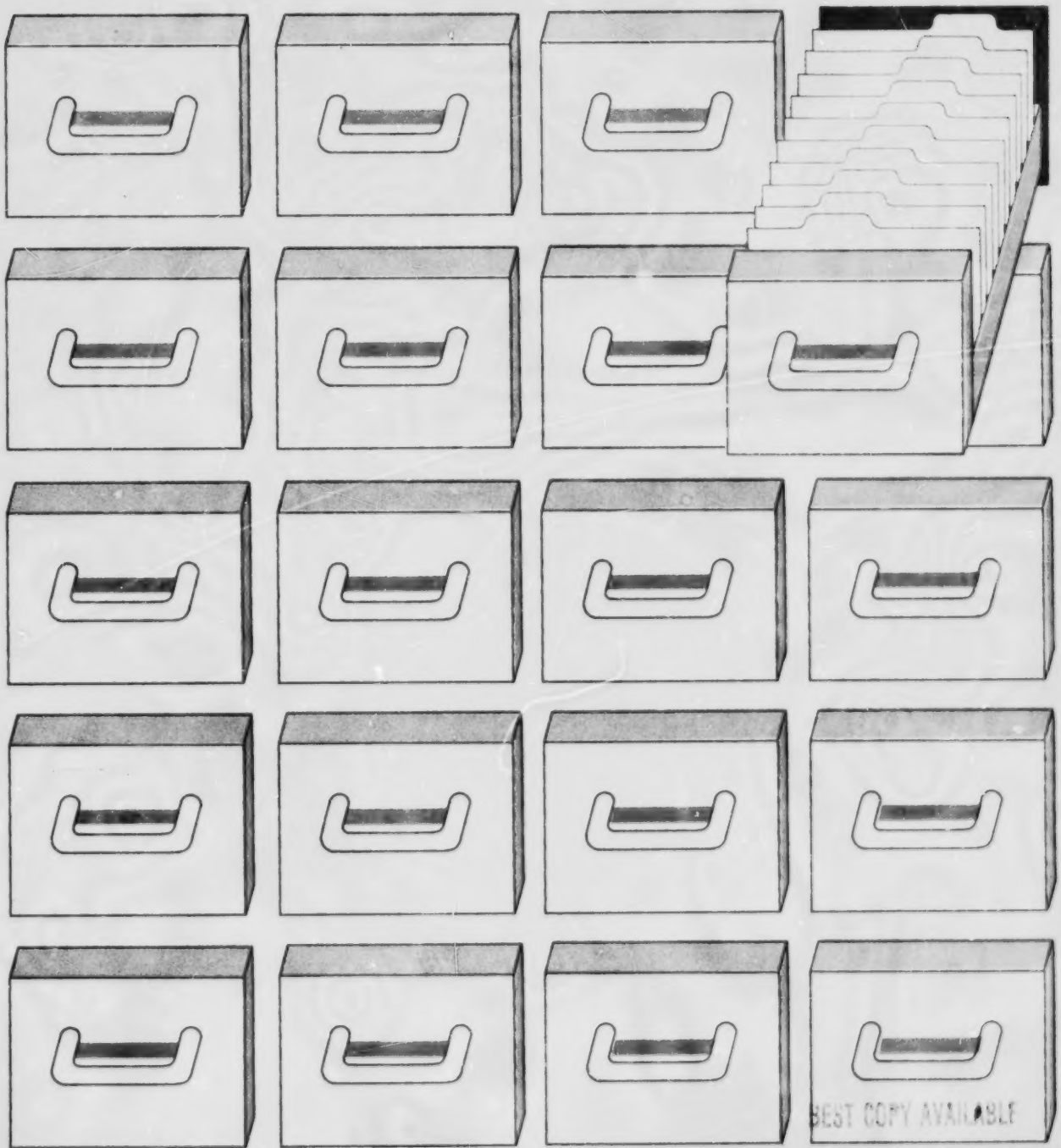

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Productivity: A Selected, Annotated Bibliography, 1979-82

U.S. Department of Labor
Raymond J. Donovan, Secretary

Bureau of Labor Statistics
Janet L. Norwood, Commissioner
December 1984

Bulletin 2212

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Preface

Productivity—the relation between physical output and input—has been studied for many years in the Bureau of Labor Statistics (BLS) by the Bureau's Office of Productivity and Technology. The interest in productivity derives from a number of concerns—the pace of technological change and its effects on employment and skills; the trend in prices and costs; and the rate at which additional goods and services become available. Thus, the study of productivity is essential in understanding the factors giving rise to variations in income and wealth, and in determining economic policy.

This bibliography, the sixth in a series, is intended to facilitate such study. It covers a large selection of books and articles that were published between 1979 and 1982. It provides annotated references for 1,400 publications dealing with concepts and methods; measurement of levels and trends; the sources of productivity change (such as technology and research); the relation of productivity to economic variables (such as wages, prices, and employment); and economic growth.

Some studies published in 1978 are included in this bibliography; they had not become available in time for inclusion in the previous one. Earlier BLS bibliographies on productivity include Bulletin 1226 (1958), Bulletin 1514 (1966), Bulletin 1776 (1971), Bulletin 1933 (1977), and Bulletin 2051 (1980).

Major sources drawn upon were the *Journal of Economic Literature;* and *Dissertation Abstracts International—Humanities and Social Sciences,* published by Xerox University Microfilm, Ann Arbor, Michigan.

The bibliography was compiled by Horst Brand, under the general direction of Charles Ardolini, Chief, Division of Industry Productivity and Technology Studies.

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Annotated Listing

Concepts and measurement

1.1 Adler, Hans J. "Selected Problems of Welfare and Production in the National Accounts." *The Review of Income and Wealth*, June 1982, pp. 121–132.

Examines recent critiques of the estimation of national accounts. Offers, as criteria in treating certain proposed extensions of the boundaries of the national accounts, credibility, comprehensibility, theoretical validity, cost, and analytical usefulness.

1.2 Adler, Paul S. "The Productivity Puzzle: Numbers Alone Won't Solve It." *Monthly Labor Review*, October 1982, pp. 15–21.

Reviews selected recent books dealing with reasons for the slowdown in productivity growth during the 1970's and early 1980's. Discusses conceptual and data problems, and reasons for the apparent inability of economic theory to provide solutions.

1.3 Brody, Andras. "On Measuring Growth." *Acta Oeconomica*, 1980, pp. 47–56.

Argues that the assumption that actual growth must be in the range between the Laspeyres and Paasche indexes is unjustified, and that statistical measurement so based usually overstates economic growth and the rise in living standards.

1.3(a) Carroll, Sidney L. and Gaston, Robert J. "Occupational Restrictions and the Quality of Service Received: Some Evidence." *Southern Economic Journal*, April 1981, pp. 959–976.

Marshalling evidence from five occupations—electricians, plumbers, dentists, sanitarians, and optometrists—the authors offer proxy measures for quality of service to consumers. They find deterioration in service associated with occupational restrictions.

1.4 Cohen, Lawrence B. "On the Interpretation of Industry Productivity Indexes." In *Aggregate and Industry-Level Productivity Analyses*. Ali Dogramaci and Nabil R. Adam, eds. Boston, Mirtinus Nijhoff, 1981, pp. 53–76.

Analyzes BLS industry productivity indexes in terms of a short-run model of the production function. Presents evidence of linear relationships between output and employee-hours for a number of industries. Argues, with reservations, that these linear relationships indicate technological stability, while the emergence of new linear functions signals a change in technology.

1.5 Comptroller General of the United States. *The Bureau of Economic Analysis Should Lead Efforts to Improve GNP Estimates*. Report to the Congress. Washington, U.S. General Accounting Office, December 27, 1982. 116 pp.

A study of revisions to the GNP over 13 recent years. Notes the small size of the revisions, and also the occasional problems they generate. Identifies the chief components of the revisions, including changes in nonfarm inventories, net exports, and corporate profits. Urges better management in deciding upon GNP data improvements.

1.6 Comptroller General of the United States. *Measurement of Homeownership Costs in the Consumer Price Index Should Be Changed*. Report to the Congress. Washington, U.S. General Accounting Office. April 16, 1981. 76 pp.

Discusses appropriateness of the CPI as a measure of price change, especially changes in the cost of homeownership. Deals with problems that arise from current methods and recommends alternative measures.

1.7 Converse, Ray. "An Index of Industrial Production in the USSR," In *USSR: Measures of Economic Growth and Development, 1950–*

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80. Studies prepared for the use of the Joint Economic Committee, U.S. Congress, December 8, 1982. Washington, U.S. Government Printing Office, pp. 169–244.

Describes the methods of estimating industrial production indexes. Analyzes Soviet industrial growth. Evaluates the indexes and presents extensive data.

1.8 Cowing, Thomas G. and Stevenson, Rodney E. *Productivity Measurement in Regulated Industries.* New York, Academic Press, 1981. 417 pp.

Collection of papers featuring studies of productivity, technology, and growth of trunk air carriers, trucking, electric power, natural gas pipelines, telecommunications, banking, and medical practice. Studies also include a discussion of the theory of total factor productivity and policy implications. See index for other studies of individual industries.

1.9 Diewert, Erwin W. "The Theory of Total Factor Productivity Measurement in Regulated Industries." *In Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 17–44.

Outlines methods used to calculate total factor productivity in competitive industries. Discusses the microeconomics of the regulated firm. Estimates, econometrically, the technology of a regulated firm and offers a modified form of an index number approach to the measurement of total factor productivity.

1.10 Dogramaci, Ali and Adam, Nabil R., eds. *Aggregate and Industry-Level Productivity Analyses.* Boston, Martinus Nijhoff, 1981. 195 pp.

Essays on methodological issues, measurement issues, and labor productivity trends in industries and over the business cycle. Essays also discuss the relation of technological change to productivity and the role of capital formation in productivity growth.

1.11 Doherty, Kerry W. *A Control Theoretic Analysis of Technological Change.* Doctoral dissertation presented to the University of Utah, 1980. 113 pp.

Incorporates technological change in the theory of the firm. Develops criteria for the optimum research budget of the firm. Treats technical knowledge as an input in the production process.

1.12 Duchesneau, Thomas D. and others. *The Measurement of Industrial Innovation.* Vol. LV, papers commissioned as background for *Science Indicators—1980.* Washington, National Science Foundation, 1980.

Features papers on the level of innovation in the U.S. economy and the identification and assessment of technological innovation, with a discussion of output indicators.

1.13 Dunbar, R.L.M. and Sarnat, M. "Measuring Industrial Stagnation: The Case of the U.S. Railroad." *Journal of Industrial Economics,* March 1980, pp. 255–268.

The authors apply techniques of stochastic dominance in attempting to derive a measure of secular stagnation, using the real rate of return on equity investment in the railroads. The authors offer three alternative efficiency criteria.

1.14 Duvall, Jerry B. *The Induced Innovation Hypothesis and Biased Technological Change in the Domestic Telecommunications Industry: A Microeconometric Analysis.* Doctoral dissertation presented to the American University, 1979. 625 pp.

Tests the thesis that technological change in communications is biased towards capital-using innovation, induced by the rate-of-return regulatory process. Devises indices of technological change bias via a neoclassical model. Finds the thesis confirmed.

1.15 Eichner, Alfred and Brecher, Charles M. *Controlling Social Expenditures: The Search for Output Measures.* Montclair, N.J., Allanheld Osmun, 1979. 210 pp.

The authors investigate how to control social expenditures more effectively by specifying certain output goals and measures. Tests authors' approach through examining New York City programs in employee training.

1.16 Eisner, Robert, and others. "Total Incomes in the United States, 1946–1976. A Summary Report." *The Review of Income and Wealth,* June 1982, pp. 133–174.

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The authors offer extended accounts for total income, product, and associated capital stock. Includes tangible and intangible capital accumulation and market and nonmarket outputs for all sectors. Among the findings is that intangible investment and net domestic capital accumulation grew faster than indicated by the conventional national accounts.

1.17 Eisner, Robert and Nebhut, David H. "An Extended Measure of Government Product: Preliminary Results for the United States." *The Review of Income and Wealth*, March 1981, pp. 33–64.

The authors present data that include the imputed values of government capital and the uncompensated services of military draftees, as well as employee compensation data. They allocate government output to consumption, capital formation, and product intermediate to other sectors, on the basis of 10 broad public functions and compare findings with the conventional product measure.

1.18 Ezaki, M. "Growth Accounting of Postwar Japan: The Input Side." *Economic Studies Quarterly*, December 1978, pp. 193–215.

Formulates a methodological frame work for growth based on input-output data. Investigates changes in input coefficients.

1.19 Fabricant, Solomon. "The Economics of Productivity: Some Options for Improvement." In *The Five Year Outlook: Problems, Opportunities, and Constraints in Science and Technology*. Vol. II. National Science Foundation. Washington, U.S. Government Printing Office, 1980, pp. 553–562.

Discusses productivity concepts, trends between goods- and service-producing industries, and forces underlying productivity change, as well as obstacles to improvement. Offers policy recommendations.

1.20 Fabricant, Solomon. "The Productivity Issue: An Overview." In *Productivity: Prospects for Growth*. Jerome M. Rosow, ed. New York, Van Nostrand Reinhold, 1981, pp. 3–34.

Discusses trends, concepts, and factors underlying productivity. Also discusses conditions and policies that stimulate or retard productivity advance.

1.21 Fatoorehchie, Mohammad. *Input Substitution in the Coal-Fired Electric Power Industry*. Doctoral dissertation presented to Utah State University, 1979. 123 pp.

Analyzes possibility of substitution between inputs and changes in technology. Estimates substitution and price demand elasticities, and provides guidelines and information for planning and design of optimally efficient coal-fired power plants.

1.22 Fuss, Melvyn and McFadden, Daniel, eds. *Production Economics. A Dual Approach to Theory and Applications*. Vol. I. *The Theory of Production*. Vol. II. *Applications to the Theory of Production: Contributions to Economic Analysis*, Nos. 110 and 111. Amsterdam, North-Holland, 1978, 482 pp. and 338 pp.

A collection of essays developing production theory in terms of observed economic data (such as prices and profits), relating this approach to underlying production technologies.

1.23 Gapinski, James H. "The Production of Culture." *The Review of Economics and Statistics*, November 1980, pp. 578–586.

Postulates a production function suitable to a nonprofit organization. Based on an econometric model, finds that live theater, opera, and symphony orchestras reveal declining marginal products for artists. Also finds decreasing returns to scale over a wide range of input values.

1.24 Garfield, Eugene. *Citation Indexing—Its Theory and Application in Science, Technology, and Humanities*. New York, John Wiley, 1979. 274 pp.

Assumes that the product of scientists' work is the production of scientific papers; discusses computer applications to indexing. Describes methods and tools of citation indexing, including underlying technologies.

1.25 Goddeeris, John H. *Insurance, Technology, and Medical Expenditures: A Study of the Interactions*. Doctoral dissertation submitted to the University of Wisconsin-Madison, 1980. 253 pp.

Theoretical examination of the effects of technological change in medicine on the demand for medical insurance. Models technological change as a shift in the relation between medical expenditure and improvement

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in health. Also deals with patterns and growth in national health expenditures.

1.26 Gold, Bela. *Productivity, Technology, and Capital: Economic Analysis, Managerial Strategy, and Government Policies.* Lexington, Mass., Heath, 1979. 318 pp.

Examines productivity in various industries in the United States and abroad. Presents a critique of prevailing methods and concepts used to determine the effects of productivity and technological capabilities. Finds that the effect of technological change has been conceived too narrowly and the relative importance of underlying factors has changed in recent decades.

1.27 Goldin, Claudia and Sokoloff, Kenneth. *The Relative Productivity Hypothesis of Industrialization: The American Case, 1820–1850.* Working Paper No. 722. Cambridge, Mass., National Bureau of Economic Research, July 1981.

Authors discuss the early development of manufacturing and the lower productivity of women and children relative to men employed in traditional agricultural economy.

1.28 Golladay, Fredrick L. "Productivity Problems in Developing Countries." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 737–749.

Surveys theories of economic development up to the early 1970's, and discusses reasons why they failed to explain continued lags in productivity in the developing countries. Also examines newer theories and discusses obstacles to productivity improvement in agriculture and manufacturing.

1.29 Gollop, Frank M. "Accounting for Intermediate Input: The Link Between Sectoral and Aggregate Measures of Productivity Growth." In National Research Council, *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 318–333.

Seeks to demonstrate the theoretical link between productivity change in the micro sectors and productivity change in the macroeconomy. Shows how, through appropriate aggregation, sectoral production accounts can be used to derive the economy-wide production account.

1.30 Gollop, Frank M. "Scale Effects and Technical Change as Sources of Productivity Growth." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 805–838.

Describes an economic model that is consistent with a constant returns-to-scale production function but which can also be used to disaggregate productivity growth among its component sources. Also reviews current research.

1.31 Grant, James H. *Substitution Among Labor, Labor and Capital, in United States Manufacturing.* Doctoral dissertation presented to Michigan State University, 1979. 229 pp.

Analyzes input demand, labor-labor, and labor-capital substitution. Examines such labor classifications as occupation, age, sex, and education. Assumes the substitutability of white-collar and blue-collar labor. Among findings is that the substitution of physical for human capital is greater in the Sunbelt than in other regions.

1.32 Haji Mohamadzaden, Ali. *Technological Change, Economies of Scale, Traded Intermediate Products, and Substitution Between Energy and Non-Energy Inputs in the U.S. Manufacturing Sector.* Doctoral dissertation submitted to Michigan State University, 1982. 262 pp.

Estimates a model in which cost and factor demand functions are conditioned upon the level of output delivered to final demand. Argues that this "net" model framework is most relevant in energy policy discussions, since energy intensity pertains to given levels of net output. Finds smaller than usual values for factor price elasticities.

1.33 Haltmaier, Jane T. *Localized Technical Change: A Theoretical and Empirical Comparison with Traditional Productivity Measurement.* Doctoral dissertation submitted to the University of California, Berkeley, 1982. 105 pp.

Applies the "local" concept to measuring biased technical change, raising the productivity of different inputs at different rates.

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Argues that traditional models skew shifts in the production functions and have other problems not encountered with a "local" concept.

1.34 Hanushek, E.A. "Conceptual and Empirical Issues in the Estimation of Educational Production Functions." *Journal of Human Resources*, Summer 1979, pp. 351–388.

Reviews such issues as the relation between student achievement and educational production, teacher accountability, educational finance systems, and school integration. Offers a critique of concepts applied in the usual discussion of these issues.

1.35 Hassanein, Saad A. *On the Explanatory Power of Econometric Models of Investment Behavior. Analysis and Comparison.* Doctoral dissertation presented to the Catholic University of America, 1980. 170 pp.

Formulates econometric models to examine investment in chemicals, paper, rubber, and textiles, 1950–76. Investigates the determinants of plant and equipment expenditures. Finds that a profit-accelerator model performs well in explaining investment behavior for three of the four industries studied.

1.36 Hersch, Joni. *Allocation of Time and Human Energy and Its Effects on Productivity: Empirical Evidence from Piece Rate Workers.* Doctoral dissertation submitted to Northwestern University, 1981. 88 pp.

Presents an econometric model relating utility to goods, leisure, and caloric intake. Finds that increases in the average hourly piece rate increases the quantity of labor time supplied by men, but reduces that supplied by women.

1.37 Hiram, David. *Productivity Accounting.* Philadelphia, University of Pennsylvania, Wharton School, 1978. 194 pp.

Offers method of calculating productivity on the company level. Discusses possible applications.

1.38 Hjerppe, Reino T. "The Measurement of Real Output of Public Sector Services." *The Review of Income and Wealth*, June 1980, pp. 237–251.

Considers the effects of conceptual and statistical revisions in the measurement of the volume of public sector services upon gross domestic product; draws example from the Finnish education sector.

1.39 Hodgson, Geoff. "Theoretical and Policy Implications of Variable Productivity." *Cambridge Journal of Economics*, September 1982, pp. 213–226.

Offers a critique of the neoclassical theory of production and of the x-efficiency theory. Relates variations in international productivity and productivity on the industrial and firm level to social and institutional forces. Discusses the theoretical approaches of Marx and Keynes, and their emphasis on labor rather than machinery as the source of productivity.

1.40 Holland, Paul and King, Benjamin. "Measurement Error in Productivity Statistics." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 221–238.

The authors provide a model to define and determine the extent of productivity measurement error. They urge adoption of this or a similar model to improve the accuracy of productivity measures.

1.41 Hope, Barney F. *The Concept of Productive and Unproductive Labor in Classical Economics.* Doctoral dissertation presented to the University of California, Riverside. 1979. 228 pp.

Examines concepts of productiveness advanced by Quesnay, Smith, and Marx. Discusses inconsistencies in these concepts and explores current Marxist thinking on the question.

1.42 Hulten, C.R. "Growth Accounting with Intermediate Inputs." *Review of Economic Studies*, October 1978, pp. 511–518.

Considers problems of calculating total factor productivity in a multisector model. Addresses issues arising from the transmission of productivity from one sector to another. Shows the aggregate rate of productivity to be the weighted average of the sectoral productivity rates, as reflected by the impact of productivity change in each sector.

1.43 Hulten, C.R. "On the 'Importance' of Productivity Change." *American Economic Review*, March 1979, pp. 126–136.

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Develops a framework for measuring the importance of productivity change as a source of economic growth, using prices and quantities. Defines as an effective rate of productivity change the residual growth in wealth not explained by changes in primary inputs.

1.44 Johnson, Neil A. *An Evaluation of the Paradox of Short-Run Increasing Returns to Labour, With Empirical Analysis for Canadian Manufacturing Industries.* Doctoral dissertation presented to the Johns Hopkins University, 1979. 267 pp.

Investigates the short-run increasing returns to labor, that is, the response of employment to output. Formulates tests for the labor-hoarding and overtime productivity hypotheses to explain the retention of labor during slack periods and the subsequent rise in output without additional labor input.

1.45 Juster, F. Thomas and Land, Kenneth C., eds. *Social Accounting. Essays on the State of the Art.* New York, Harcourt Brace, 1981. 479 pp.

Research papers concerned with the development and integration of national data systems and social indicator analysis. Presents an evaluation of social accounting systems.

1.46 Juster, F. Thomas and others. "A Theoretical Framework for the Measurement of Well-Being." *The Review of Income and Wealth,* March 1981, pp. 1–32.

The authors specify a conceptual framework in which resources are limited by "human time" and the inherited stock of wealth. They argue that these resources are used within households to produce tangible as well as intangible outputs, and these, in turn, are used to produce satisfactions or to augment capital stocks or both. Formulates a household production theory.

1.47 Omitted.

1.48 Kalleck, Shirley. "Government Statistics for Productivity Research." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 1071–1084.

Examines data sources for productivity measurement, with special attention to data generated by the U.S. Bureau of the Census. Discusses such problems as definitional differences, data gaps, cost, and comparability of reporting units. Measurement examined also from the point of view of the use of micro data.

1.49 Kalt, J.P. "Technological Change and Factor Substitution in the United States, 1929–1967." *International Economic Review,* October 1978, pp. 761–775.

Presents an empirical examination of the U.S. aggregate constant economies of scale production function. Derives direct estimation of technological change in a constant economies of scale context. Finds the elasticity of substitution to have been more likely close to unity than to zero. Discusses recent concerns about capital shortages.

1.50 Kamien, Morton, I. and Schwartz, Nancy L. *Market Structure and Innovation.* New York, Cambridge University Press, 1982. 241 pp.

A survey of the literature on the microeconomics of technical advance. Finds current thinking to stress demand pull, or economic opportunity, in spurring invention, rather than technological opportunity.

1.51 Kelly, Rita Mae. "Ideology, Effectiveness, and Public Sector Productivity: With Illustrations from the Field of Higher Education." *Journal of Social Issues,* No. 4, 1980, pp. 76–97.

Discusses two approaches to public sector productivity: A quality productivity ratio and a service productivity ratio, emphasizing the latter.

1.52 Kerr, William A. *Micro Economic Approaches to Technical Change in the Canadian Beef Cattle Industry: Two Studies of Crossbreeding as an Innovation.* Doctoral dissertation submitted to the University of British Columbia, 1981. No pp. indicated.

Analyzes effects of market forces on processes necessary for generic-based technological change, including the expansion of genetic pools, inbreeding of divergent genetic strains, and crossing of pure breeding strains to take advantage of hybrid vigor. Develops requisite econometric models.

1.53 Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Meas-*

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urement and Analysis. National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. 44, Chicago, University of Chicago Press, 1980. 717 pp.

A collection of papers dealing with labor and multifactor productivity by industry; problems of defining and measuring outputs and inputs in transportation and government; the impact of R&D and energy on productivity; and productivity in agriculture and industry in international perspective.

1.54 Khan, Ali and Sirageldin, Ismail, eds. *Research in Human Capital and Development.* Greenwich, Conn., JAI Press, 1981. 228 pp.

Research papers dealing with topics such as: Problems of productivity increases in a service-dominated economy and utility-maximizing models of human capital.

1.55 Kirkland, Lane. "Productivity: A Labor View." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 1211-1219.

Discusses frictions that arise from faulty measures of productivity; incorrect analysis of the causes of inflation and declining productivity; stress on quantity rather than quality; and, failure to reach a consensus on why productivity is declining.

1.56 Klotz, Benjamin and others. "A Study of High and Low 'Labor Productivity' Establishments in U.S. Manufacturing." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Dimensions in Productivity Measurement and Analysis.* National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. 44. Chicago, The University of Chicago Press, 1980, pp. 239-286.

The authors use a plant-level set of data to examine differences in plant productivity within industries and to determine whether high or low productivity may be attributed to the same factors. They introduce a general production function to test whether the function's parameters differ between high and low productivity establishments and they propose ways of organizing data to improve the analysis of productivity differences among establishments.

1.57 Kokkelenberg, Edward C. *The Demands for Capital and Labor and Their Utilization Rates in Post World War II U.S. Manufacturing.* Doctoral dissertation submitted to Northwestern University, 1981. 176 pp.

Deals with the problem of modeling the firm's demands for capital and labor and their utilization rates. Develops a model incorporating a number of relevant variables.

1.58 Kraus, Jerome. "Adapting Accounting Systems for Productivity Analysis." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 551-569.

Examines the concept of company productivity as related to accounting. Describes recent research. Gives examples of measurement systems and analyzes in detail the company productivity measurement scheme at ITT Corporation.

1.59 Kuipers, Simon K. "Keynsian and Neoclassical Growth Models: A Sequential Analytical Approach." *De Economist,* 1981, pp. 58-104.

Develops models for the short, medium, and long terms. Finds that Keynesian growth theory applies to the medium term, neoclassical to the long term. Also finds that the two differ according to expectations regarding factor prices and capacity utilization.

1.60 Laing, Neil F. *Technological Uncertainty and the Pure Theory of Allocation. An Essay.* Bedford Park, Australia, Flinders University of South Australia, 1978. 151 pp.

Explores the possible impact of future technological developments and upon the theory of allocation, including economic growth. Outlines the history of allocation theory, production and price uncertainty, and problems of economic policymaking.

1.61 Lal, Kishori. "Compilation of Input-Output Tables: Canada." *The Review of Income and Wealth,* December 1982, pp. 411-430.

Describes the accounting framework of the annual Canadian input-output tables. Demonstrates the relation of the Canadian national accounts to the tables. Offers a critique of aggregation techniques.

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1.62 Leamer, E.E. "The Leontief Paradox, Reconsidered." *Journal of Political Economy*, June 1980, pp. 495-503.

Argues that, contrary to Leontief's findings, the United States in 1947 was capital abundant. Also evaluates Leontief's finding that the capital-worker ratio in export industries has been lower than the capital-worker ratio in import industries.

1.63 Leveson, Irving. "The Modern Service Sector: Emerging Patterns of Output, Employment, Productivity and Prices in U.S. Service Industries, and Some Implications for Future Trends and Policies." In *Human Resources and Demographics: Characteristics of People and Policy. Special Study on Economic Change*, Vol. 1. Joint Economic Committee, U.S. Congress, December 13, 1980. Washington, U.S. Government Printing Office, pp. 32-70.

Discusses the nature of the service industries, measurement problems, the relation between goods-producing and service-producing industries, and economic growth. Also discusses prospective service employment growth.

1.64 Leveson, Irving. "Productivity in the Services: Issues for Analysis." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research*, The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 765-803.

Poses as a central issue for productivity measurement, the rapid growth of service industries and the evidence for strong productivity advances in these industries. Discusses measurement problems and their possible resolution. Offers observations on international implications of the rise in services. Presents an agenda for further research.

1.65 Lopez, R.E. "The Structure of Production and the Derived Demand for Inputs in Canadian Agriculture." *American Journal of Agricultural Economics*, February 1980, pp. 38-45.

Argue the existence of an aggregate cost function, hence an aggregate production function for Canadian agriculture. Derives input demand equations for labor, capital, land and structures, and intermediate inputs.

1.66 Loschky, D. "Seven Centuries of Real Income per Wage Earner Reconsidered." *Economica*, November 1980, pp. 459-65.

Examines the differences in findings stemming from the use of the Laspeyres, Paasche, and Chain indexes.

1.67 McIntire, James L. "Problems with the Measurement of Productivity." In *Productivity: The Foundation of Growth. Special Study on Economic Change*, Vol. 10. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 58-66.

Reviews current measurement practices and problems associated with them. Appraises effects of biases and errors. Also discusses international productivity comparisons.

1.68 Maddala, G.S. "A Note on the Form of the Production Function and Productivity." In National Research Council. *Measurement and Interpretation of Productivity*. Washington, National Academy of Sciences, 1979, pp. 309-317.

Investigates whether measures of multifactor productivity differ significantly from other functional forms of production functions. Considers a limited class of such function and finds the differences to be negligible.

1.69 Malcomson, James M. "The Measurement of Labour Cost in Empirical Models of Production and Employment." *The Review of Economics and Statistics*, November 1980, pp. 521-528.

Explores problems for econometric work arising from adjustment costs encountered by a firm altering its labor force or capital stock.

1.70 Mark, Jerome A. "Discussion of Current Retardation in U.S. Productivity Growth." *American Economic Review*, May 1980, pp. 353-354.

Discusses problems of BLS productivity measurement such as the use of hours paid rather than worked, weighted labor input measures, and issues of capital measurement.

1.71 Mark, Jerome A. *Productivity Improvement: The Government's Role with Regard to Measurement*. Before the Society of Government Economists, 12th Annual Conference, Washington, D.C., March 19, 1982. 13 pp.

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Outlines the BLS program of labor productivity measures. Discusses plans for multifactor measures and work to improve labor input measures. Raises problem of future data availability.

1.72 Mark, Jerome A. "Productivity Measurement." In *Productivity: Prospects for Growth.* Jerome M. Rosow, ed. New York, Van Nostrand Reinhold, 1981, pp. 54–75.

Discusses concepts of measures of output and of various inputs, including labor and capital. Examines available productivity measures and the problems in computing them.

1.73 May, J.D. and Denny, M. "Factor-Augmenting Technical Progress and Productivity in U.S. Manufacturing." *International Economic Review,* October 1979, pp. 759–774.

The authors explore the implications of conventional (noneconometric) productivity measurement for technical change, estimating a translog cost function with a general specification for technical change.

1.74 Meyer, John R. and Gomez-Ibanes, Jose A. "Measurement and Analysis of Productivity in Transportation Industries." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. 44, Chicago, The University of Chicago Press, 1980, pp. 295–332.

The authors discuss the difficulties of measuring productivity in the transportation industries. Reviews recent estimates productivity trends in trucking and railroads and presents research on productivity in urban mass transit, 1948–70.

1.75 Militzer, Kenneth H. "Productivity Measures at the Firm Level." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 305–318.

Discusses the relation between macro and micro measures of productivity. Cites some of the disadvantages of applying macro concepts at the firm level. Describes the Bell System experience.

1.76 Miller, Edward M. "Differences in Productivity by Size of Firm and Region." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 839–853.

Describes procedures of measurement, particularly value added per employee. Finds low productivity of smaller firms. Also discusses methods of measuring regional productivity differences and presents findings.

1.77 Mohr, Michael F. "Concepts in the Theory and Mesurement of Productivity." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 855–934.

Explains the relation of productivity measurement to energy price changes and inflation, and develops concepts essential to productivity research. Identifies and classifies factors affecting productivity growth and provides an overview for the postwar period. Finds the source of productivity slowdown in certain measurement problems, as well as the incomplete adjustment of the production process to energy price increases and shortages, regulatory policies, and tax and fiscal actions.

1.78 Mohr, Michael F. "The Long-Term Structure of Production, Factor Demand, and Factor Productivity in U.S. Manufacturing Industries." In Kendrick, John and Vaccara, Beatrice N., eds. *New Dimensions in Productivity Measurement and Analysis.* National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. 44. Chicago, The University of Chicago Press, 1980, pp. 137–229.

Sets forth a procedure to partition observed productivity series in industries into cyclical and secular components. Describes his model in detail, as well as the method used to transform measures of least-cost input shares into lease-cost or long-run measures of factor demand and factor productivity.

1.79 Monte-White, Kay and Eaton, Kenneth. *Measurement of Attorney Productivity: Assessing Productivity of Staff Attorneys at the Board of Veterans Appeal.* Washington, U.S. Office of Personnel Management, October 1980. 19 pp.

The authors describe how output and quality are measured. Discuss pertinent standards

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formulated in terms of the average time needed and to complete a decison on a particular issue and weighted according to complexity and set forth measurement procedures.

1.80 Monte-White, Kay. *Productivity Measurement Systems Within the Federal Government: A State of the Practice Review.* Washington, U.S. Office of Personnel Management, June 1980. 124 pp.

Presents a brief history of productivity measurement in the Federal Government and describes the Federal productivity measurement system. Discusses pertinent issues and describes systems in specific agencies.

1.81 Moon, Douglas I. "Technological Change and Productivity in Input-Output Analysis and the Potential of Sectoral Optimization Models." In *Aggregate and Industry-Level Productivity Analyses.* Ali Dogramaci and Nabil R. Adam, eds. Boston, Martinus Nijhoff, 1981, pp. 31–50.

Describes how input-output models encompass technological change, using such models to examine changes in the relation between technology and productivity. Develops sectoral optimization input-output models to reflect "best practice," after discussing the more conventional models, including Leontie's.

1.82 Moss, Milton, "Welfare Dimensions of Productivity Measurement." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 276–308.

Argues that goods and services as measured in the national account include a substantial component of welfare, but that other measures are needed to evaluate effectiveness. Also argues the infeasibility of constructing a single index of welfare or the assessment of the real cost of resource changes associated with such an index.

1.83 Myers, John G. and Nakamura, Leonard. "Data Adequacy for Productivity Analysis: A Case Study of the Primary Paper Industry." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 391–422.

Examines output measures dealing with four sources of primary data, their computational methods, and the deflators and employee-hour weights used in their construction. Also deals with materials input and underlying data sources and limitations.

1.84 Nadiri, M. Ishaq, and Schankerman, M.A. "Technical Change, Returns to Scale, and the Productivity Slowdown." *American Economic Review.* May 1981, pp. 314–319.

The authors demonstrate a framework for disaggregating total factor productivity in the presence of economies of scale. Finds that declining demand is a leading factor of slowed productivity in manufacturing.

1.85 National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979. 449 pp.

Presents report of the Panel to Review Productivity Statistics, as well as papers on productivity measurement, outputs of hospitals, welfare dimensions of productivity measurement, accounting for intermediate inputs, workforce composition adjustments, data adequacy, productivity in the men's and boys' clothing industry, and others. Papers also listed individually in this bibliography.

1.86 National Research Council. "Report." *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 3–218.

After discussing the uses, misuses and limitations of productivity measures, the Report reviews basic concepts, including the production function, present official productivity measures and their shortcomings, the measurement of outputs and inputs, sources of change in productivity trends, and international comparisons. Includes a series of recommendations for revisions, reductions in error, improved price indexes, and the use of weighted labor input measures.

1.87 Nelson, Richard R. "Production Sets, Technological Knowledge, and R & D: Fragile and Overworked Constructs for Analysis of Productivity Growth." *American Economic Review.* May 1980, pp. 62–67.

Offers a critique of such concepts as the production set, technological knowledge as determining the production function, and R&D as specialized activity advancing technological knowledge.

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1.88 Nelson, Richard R. "Research on Productivity Growth and Productivity Differences: Dead Ends and New Departures." *Journal of Economic Literature*, September 1981, pp. 1029–1064.

Considers the theoretical models underlying research on productivity growth. Critically reviews the literature pertaining to such topics as the determinants of productivity at the firm level, dynamics of technological advance, and the sources of growth.

1.89 Nishimizu, Mieko and Page, John M. Jr. "Total Factor Productivity Growth, Technological Progress and Technical Efficiency Change: Dimensions of Productivity Change in Yugoslavia, 1965–78." *The Economic Journal*, December 1982, pp. 920–936.

The authors propose a method for disaggregating total factor productivity change into technological progress and changes in technical efficiency. Defines the former as changes in the best-practice production frontier and the latter in terms of all other productivity changes.

1.90 Oliver, Richard, and others. *BLS Economic Growth Model System Used for Projections to 1990.* Bulletin 2112. Washington, U.S. Government Printing Office, April 1982. 108 pp.

The authors describe methods, models, and techniques of projecting the labor force, final demand, intermediate demand, industry output and employment, occupational employment, and the economy as a whole. They discuss the projection of components of these aggregates.

1.91 Pasinetti, Luigi L. *Structural Change and Economic Growth: A Theoretical Essay on the Dynamics of the Wealth of Nations.* New York, Cambridge University Press, 1981. 281 pp.

Investigates the long-term evolution of industrial economic systems, developing a "pure production" model to analyze economic growth and its operating mode.

1.92 Patterson, K.D. and Schott, Kerry, eds. *The Measurement of Capital. Theory and Practice.* New York, Holmes & Meier, 1979. 290 pp.

A collection of essays dealing with such issues as capital measurement under general equilibrium, statistics of capital stock assets and of human capital in the United Kingdom, capital utilization, and/or demand functions.

1.93 Penz, Alton and Brake, Dennis. *A National Index for Energy Productivity.* A Study Prepared for the Use of the Joint Economic Committee, U.S. Congress, 1981. Washington, U.S. Government Printing Office. 42 pp.

The authors discuss changes in the economics of energy and defines energy productivity. They examine goals of measuring energy productivity and the criteria for selecting indexes. Propose aggregate measures.

1.94 Perlman, Mark. "One Man's Baedeker to Productivity Growth Discussions." In *Contemporary Economic Problems, 1979.* Washington, American Enterprise Institute for Public Policy Research, 1979, pp. 79–113.

Presents an overview of data on productivity growth. Discusses the expansion of the number of inputs that are measured. Surveys reasons advanced for the recent productivity slowdown.

1.95 Pitzer, John. "Gross National Product of the USSR, 1950–80." *USSR: Measures of Economic Growth and Development, 1950–80.* Studies prepared for the use of the Joint Economic Committee, U.S. Congress, December 8, 1982. Washington, U.S. Government Printing Office, pp. 3–168.

Discusses estimating procedures and findings. Describes the accounting framework and valuation. Analyzes problems in calculating volume indexes of economic activity. Presents extensive data.

1.96 Pomeranz, Felix. "Social Measurement: Concepts and Practices." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 403–412.

Discusses how the national accounts make it difficult to determine whether and to what extent social goals deter productivity improvement. Defines social measurement and its current state. Presents international comparisons. Also discusses nongovernmental areas of social action impinging on social measurement.

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1.97 Popkin, Joel. "Comparison of Industry Output Measures in Manufacturing." In National Research Council. *Measurement and Interpretation of Productivity.* Washington National Academy of Sciences, 1979, pp. 363–390.

Compares year-to-year and trend movements between the Federal Reserve index of production and the Bureau of Economic Analysis annual measure in gross output originating in industry. Breaks down the analysis by time periods, and suggests reasons for the differences.

1.98 Postner, Harry H. "Problems of Identifying and Measuring Intermediate (Producer) Services in the Completion and Use of Input-Output Tables." *The Review of Income and Wealth,* June 1982, pp. 217–242.

Views the problems referred to in the title as stemming chiefly from the company-establishment statistical dichotomy. Offers suggestions for overcoming this dichotomy. Explores the implications of evolving information technology for I–O compilation.

1.99 Prywes, Menahem M. *Three Essays on the Econometrics of Production, Productivity, and Capacity Utilization.* Doctoral dissertation submitted to the University of Pennsylvania, 1981. 368 pp.

Develops methods of representing production. Presents empirical means for portraying substitution possibilities and for the sources of productivity change in American industry.

1.100 Rees, Albert. "Improving the Concepts and Techniques of Productivity Measurement." *Monthly Labor Review,* September 1979, pp. 23–27.

Presents recommendations of the National Academy of Science's Panel to Review Productivity Statistics. Discusses concepts of output and their problems, the need for better data on work hours, multifactor productivity, and proper interpretation of productivity measures. Also notes the Panel's finding that the productivity slowdown of the 1970's reflected real rather than merely statistical phenomena.

1.101 Rees, Albert. "Improving Productivity Measurement." *American Economic Review,* May 1980, pp. 340–342.

Offers a general critique of current measurement techniques and underlying data.

1.102 Ripley, Frank C. "Postwar Trends in the Uses of the National Output—A GNP Budget Approach." In *Federal Finance: The Pursuit of American Goals. Special Study on Economic Change,* Vol. 6. Joint Economic Committee, United States Congress, December 28, 1980. Washington, U.S. Government Printing Office, pp. 1–24.

Outlines underlying concepts of the national output, discusses its uses from 1952 to 1977, and the major determinants of its composition.

1.103 Roman, Zoltan. *Productivity and Economic Growth.* Budapest, Akademiai Kaido, 1982. 275 pp.

Discusses notions of productivity in Marxian and other economic theories. Assesses measurement and analysis of productivity, using input-output tables. Presents data on international levels of productivity and gross domestic product. Analyzes sources underlying productivity change.

1.104 Rosen, Ellen Doree. "O-K Work: Incorporating Quality into the Productivity Equation." *Public Productivity Review,* September 1981, pp. 207–218.

Proposes to correct quantity of output by a coefficient of quality, derived by comparing the achieved quality level with standards for any number of quality criteria, aggregated by appropriate weights.

1.105 Ruch, William A. "Measuring Knowledge Worker Productivity." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 339–358.

Surveys existing programs run by major firms, as well as pertinent academic research. Offers suggestions for developing productivity measures for knowledge workers.

1.106 Sato, Ryuzo and Ramachandran, Rama. "Measuring the Impact of Technical Progress on the Demand for Intermediate Goods. A Survey." *Journal of Economic Literature,* September 1980, pp. 1003–1024.

The authors survey investigations of the impact of technical progress on intermediate

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goods by means of input-output analysis and the production function approach. Explore measures of total factor productivity and partial productivity measures.

1.107 Schluter, Gerald and Beeson, Patty. "Components of Labor Productivity Growth in the Food System, 1958-67." *The Review of Economics and Statistics*, August 1981, pp. 378-384.

Based upon a previous study, the authors define the output of the food system in terms of personal consumption expenditures, and develops a commensurate measure of labor input, using input-output data.

1.108 Schroeder, Gertrude E. and Denton, M. Elizabeth. "An Index of Consumption in the USSR." *USSR: Measures of Economic Growth and Development, 1950-80.* Studies prepared for the use of the Joint Economic Committee, United States Congress, December 8, 1982. Washington, U.S. Government Printing Office, pp. 317-401.

The authors analyze trends and patterns of consumption in the USSR. Describing and evaluating the consumption index and its components.

1.109 Scott, Richard W. "Measuring Outputs in Hospitals." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 255-275.

Reviews various approaches to calculating productivity indexes for hospitals, emphasizing concepts of hospital outputs. Summarizes research done at the Stanford Center for Health Care Research which adjusts services and outcomes for differences among patients and measures several types of diagnostic and therapeutic services directly.

1.110 Searle, Allan D. and Waite, Charles A. "Current Efforts to Measure Productivity in the Public Sector: How Adequate for the National Accounts?" In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research, *Studies in Income and Wealth*, Vol. 44. Chicago. The University of Chicago Press, 1980, pp. 333-350.

The authors discuss current productivity measurement of the Federal civilian workforce, and more modest efforts by State and local authorities. Suggests that these efforts are not an adequate basis for adjusting existing measures of government output in the national accounts, if such output is in terms of public goods, rather than of results of governmental processes. Reviews alternate government output concepts.

1.111 Severin, Barbara and Hughes, Margaret. "An Index of Agricultural Production in the USSR." *USSR: Measures of Economic Growth and Development, 1950-80.* Studies prepared for the use of the Joint Economic Committee, United States Congress, December 8, 1982. Washington, U.S. Government Printing Office, pp. 245-316.

The authors describe construction of the agricultural index, evaluate Soviet indexes, and compare an index prepared by the CIA with other indexes of agricultural production.

1.112 Sha, Sharon de. "Revisions in BLS Output per Hour." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 239-254.

Assesses reliability of preliminary estimates of output per hour published by the BLS. Lists reasons for frequent revisions and compares past revisions. Recommends that the BLS make its own assessment of the reliability of its initial and later estimates.

1.113 Siegel, Irving H. *Company Productivity. Measurement for Improvement.* Kalamazoo, Mich., The W.E. Upjohn Institute for Employment Research, April 1980. 88 pp.

Discusses reasons why companies should measure their productivity. Explores the meaning of productivity. Shows how a productivity program may be set up, and gives examples.

1.114 Siegel, Irving H. "Need for Improvement in Government Productivity Information." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 1057-1069.

Discusses productivity information gaps as analyzed by the National Academy of Sciences Panel to Review Productivity Statistics.

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Suggests priorities for remedying inadequacies, such as improvement in construction data. Argues for more research on company-level productivity.

1.115 Simos, Evangelos. "Structural Change in the Production Function: Evidence from the U.S. Private Economy, 1929–1973." *Zeitschrift fuer Nationaloekonomie,* 1980, pp. 149–168. (University of New Hampshire, Durham.)

Finds that estimated coefficients evidenced fundamental shifts during the period studied.

1.116 Skancke, Steven L. *Productivity in Wholesale Trade: Measurement and Analysis of Labor Productivity in Merchant Wholesaling.* Doctoral dissertation submitted to the George Washington University, 1981. 242 pp.

Presents productivity estimates by commodity line, together with associated variables, using real sales per hour as the output measure. Finds productivity growth to have averaged 2.8 percent per year, 1948–72.

1.117 Stewart, William T. "Productivity Measurement at the Firm Level." *Manufacturing Productivity Frontiers,* February 1980, pp. 6–11.

Defines productivity and the objectives of productivity measurement. Indicates function that might be measured and the calculation of a composite productivity index.

1.118 Sudit, Ephraim F. and Finger, Nachum. "Methodological Issues in Aggregate Productivity Analysis." In *Aggregate and Industry-Level Productivity Analyses.* Ali Dogramaci and Nabil R. Adam, eds. Boston, Martinus Nijhoff, 1981, pp. 7–30.

The authors cover topics in which analytical and interpretative issues have arisen, including the concept of total factor productivity and indexes, aggregation biases, separability assumptions in productivity measurement, concepts in the measurement of capital, and the relation of productivity indexes and production functions.

1.119 Tanaka, Fujio J. *The Reproduction Schemes of Marx and Keynes.* Doctoral dissertation presented to the New School for Social Research, 1980. 223 pp.

Argues that, while both Keynes and Marx looked for causes of economic breakdown in the economic system itself, Keynes found them chiefly in lagging effective demand, while Marx traced them to the system of capitalist production, the relations between capital and labor, and the resulting distribution of the national income.

1.120 Tyler, W.G. "Technical Efficiency in Production in a Developing Country: An Empirical Examination of the Brazilian Plastics and Steel Industries." *Oxford Economic Papers,* November 1979, pp. 477–495.

Estimates several indexes of technical efficiency. Finds substantial relative technical inefficiency, with only a small proportion of firms producing more than 80 percent of capacity.

1.121 U.S. Central Intelligence Agency. *USSR: Measures of Economic Growth and Development, 1950–80.* Studies prepared for the use of the Joint Economic Committee, United States Congress, December 8, 1982. Washington, U.S. Government Printing Office. 401 pp.

Presents estimates of the gross national product of the USSR, an index of industrial and agricultural production, and a consumption index. Discusses estimating methods as well as results. See also separate entries under John Pitzer, Ray Converse, Barbara Severin, Margaret Hughes, Gertrude Schroeder, and Elizabeth Denton.

1.122 U.S. General Accounting Office. *A Primer on Gross National Product Concepts and Issues.* Study by the Staff. Washington, April 8, 1981. 62 pp.

Discusses issues pertaining to the accuracy, reliability, estimating methods, and concepts underlying the GNP. Deals with past revisions, and analyzes measures of error. Also discusses issues surrounding what GNP should include or exclude.

1.123 Usher, Dan. *The Measurement of Capital.* National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. 45. Chicago, University of Chicago Press, 1980. 557 pp.

Discusses such subjects as the problem of constructing time series of capital in real terms, patterns of depreciation of capital

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goods, changes in the nature of such goods, and index numbers and aggregation problems.

1.124 Usher, Dan. *The Measurement of Economic Growth.* New York, Columbia University Press, 1980. 306 pp.

Discusses the theory of economic growth and then examines concepts of real consumption and investment, notions of depreciation, imputations, the specification of commodities, and index numbers. Applies the framework to Canadian data.

1.125 Wolf, C. Jr. "Economic Efficiency and Inefficient Economics." *Journal of Post Keynesian Economics,* Fall 1979, pp. 71–82.

Argues that economics neglects nonmarket efficiencies which are essential to the market system and also neglects nonmarket inefficiencies which causes problems in planning systems.

1.126 Wolpe, Harold, ed. *The Articulation of Modes of Production.* Essays from *Economy and Society.* Boston, Routledge and Kegan Paul, 1980. 320 pp.

Discusses the problem of growth in capitalist economies, and its relation to growth of productive units in precapitalist economies.

1.127 Zolotas, Xenophon. *Economic Growth and Declining Social Welfare.* New York, New York University Press, 1981. 199 pp.

Formulates an index of economic aspects of welfare and examines quality of life indicators. Finds that a diminishing rate of social welfare improvement has accompanied economic growth in affluent societies.

Measures

Total economy and the private sector

2.1 American Productivity Center. *Productivity Perspectives. A Chartbook of Key Facts on U.S. Productivity in an Increasingly Competitive World.* Houston, American Productivity Center, 1980. 64 pp.

Presents charts and explanatory texts with data on trends in labor, capital, and multifactor productivity, and the forces underlying these trends. Compares the American performance with other industrial countries. Offers projections to 1990.

2.2 Amsalem, Michel A. "The Decline in Productivity Growth—Causes, Consequences, and Possible Remedies." *The Columbia Journal of World Business,* Winter 1981, pp. 48–56.

Discusses dimensions of the decline in productivity growth and explanations for it. Finds that no single theory suffices to explain it. Also finds that the conjunction of factors that caused the decline must be dealt with by a mix of appropriate policies.

2.3 Bennett, Paul. "American Productivity Growth: Perspectives on the Slowdown." *Quarterly Review,* Federal Reserve Bank of New York, Autumn 1979, pp. 25–31.

Examines productivity growth historically. Finds that the slowdown of the 1970's was linked to the end of a period when workers were leaving low-productivity jobs in agriculture and also centered in a few nonmanufacturing industries.

2.4 Bernanke, Ben. *The Sources of Labor Productivity Variation in U.S. Manufacturing, 1947–80.* Working Paper No. 712. Cambridge, Mass., National Bureau of Economic Research, July 1981.

Develops a model in which it is assumed that productivity and other chosen variables respond optimally to certain exogenous shocks.

2.5 Berndt, Ernst R. "Energy Price Increases and the Productivity Slowdown in United States Manfacturing." In *The Decline in Productivity Growth.* Conference proceedings. Boston, Federal Reserve Bank, June 1980, pp. 60–92. (Includes comments by Paul R. Gregory.)

Examines effect of energy price changes on growth rates of labor and total factor productivity. Argues that productivity slowdown was related to the expansion of white-collar labor and the declining output without a reduction in capital formation. Presents economic models sustaining the argument.

2.6 Boskin, Michael J. "Economic Growth and Productivity." *The Economy in the 1980s: A Program for Growth and Stability.* New

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Brunswick, N.J., Transaction Books, 1980, pp. 113–145.

Deals with some explanations of the slowdown in productivity in the 1970's. Argues that the slowdown was linked to inflation, high marginal tax rates, excessive government regulation, and the displacement of private activity by government.

2.7 Brunner, Lawrence P. *The Incidence of United States Total Factor Productivity Change in the 1947–74 Period*. Doctoral dissertation submitted to the Johns Hopkins University, 1981. 356 pp.

Accounts for the effects of productivity change on labor with greater or lesser skills, as well as for the impact of such change on the growth of the capital stock. Finds that the factor shares of white-collar and skilled blue-collar labor increased over the review period, while those of unskilled labor declined.

2.8 Carrington, John C. and Edwards, George T. *Reversing Economic Decline*. New York, St. Martin's Press, 1981. 194 pp.

The authors examine the decline of productivity in the United Kingdom, discussing factors affecting economic variable, such as savings and investment. They develop a model of the national financial system to evaluate economic problems. Recommend policies to increase savings and real investment and cheapening of investment funds for manufacturing industry.

2.9 Caves, Richard E. "The Structure of Industry." In *The American Economy in Transition*, Martin Feldstein, ed. Chicago, The University of Chicago Press, 1980, pp. 501–545.

Examines the sectoral composition of the economy and its enterprise structure in terms of legal form and size distribution of firms. Discussion individual product market and large companies in terms of concentration, extent of multiplant operations, diversification, and mergers. Also describes certain strategic factors in market behavior such as R&D and advertising outlays.

2.10 Chinloy, Peter. *Labor Productivity*. Cambridge, Mass., Abt Books, 1981. 144 pp.

Examines the growth in postwar productivity in U.S. business. Documents the total-factor productivity slowdown in the 1970s. Uses growth accounting methods.

2.11 Christainsen, Gregory B. and Haveman, Robert. "The Determinants of the Decline in Measured Productivity Growth: An Evaluation." In *Productivity: The Foundation of Growth. Special Study on Economic Change*. Vol. 10. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 1–17.

The authors discuss underlying factors that made for slow productivity growth after 1965, including output composition, advances in knowledge, the capital-labor ratio, economies of scale, and environmental regulations.

2.12 Comptroller General of the United States. *Government Measure of Private-Sector Productivity: Users Recommend Changes*. Report to the Congress. Washington, July 8, 1980. 57 pp.

Finds that users of productivity measures favor firm-level industry measures, greater explanation about currently published measures, and measures whose inputs derive from labor and capital. Report is based on a survey of users of BLS productivity measures.

2.13 Comptroller General of the United States. *Industrial Policy: Japan's Flexible Approach*. Report to the Chairman, Joint Economic Committee, U.S. Congress, June 23, 1982. Washington, General Accounting Office. 79 pp.

Discusses how the Japanese government ensured access to capital by selected industries, using low-interest loans and savings. Analyzes nature and methods of microeconomic planning and industrial development, partly by means of rationing foreign exchange. Investigates the success Japanese government measures have had.

2.14 Comptroller General of the United States. *Stronger Effort Needed to Foster Private Sector Productivity*. Report to the Congress February 18, 1981. Washington, General Accounting Office. 46 pp.

Discusses effectiveness of the National Productivity Council in guidance and coordinating Federal Government efforts. Finds that the Council has been ineffective.

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2.15 Darby, Michael R. *The U.S. Productivity Slowdown: A Case of Statistical Myopia*. World Paper No. 1018. Cambridge, Mass., National Bureau of Economic Research, November 1982. 56 pp.

Compares employment and productivity trends for 1900–1929, 1919–1965, and 1965–1978. Finds rapid growth in employment and hours over the first and third periods, and a slowdown in productivity in both compared to the second period. Argues that adjustment for labor quality changes eliminates the slowdown in the two periods.

2.16 Denison, Edward F. "Where has Productivity Gone?" In *Contemporary Economic Problems, 1979*. Washington, American Enterprise Institute for Public Policy Research, 1979, pp. 71–77.

Discusses reasons for the slowdown in productivity in recent years in terms of the sources of growth in net national income per person employed.

2.17 Duncan, Joseph W. and Shelton, William C. *Revolution in United States Government Statistics*. U.S. Department of Commerce, Office of Federal Statistical Policy and Standards, Washington, 1978. 257 pp.

The authors discuss key statistical developments and innovations influencing government statistics since the 1920's. In particular, they survey probability sampling and its applications; the national income and product accounts; mechanization and computers, and the buildup of a Federal statistical system.

2.18 Feldstein, Martin, ed. *The American Economy in Transition*. Chicago, The University of Chicago Press, 1980. 696 pp.

Includes presentations on technology and productivity, the structure of industry, and the evolution of labor markets. Further references under Mansfield, Caves, and Freeman.

2.19 Fellner, William. "The Declining Growth of American Productivity. An Introductory Note." In *Contemporary Economic Problems, 1979*. Washington, American Enterprise Institute for Public Policy Research, 1979, pp. 3–12.

Discusses policy-related factors underlying the slowdown in productivity during the 1970's. Derives a numerical estimate for the impact of these factors.

2.20 Fellner, William, ed. *Contemporary Economic Problems, 1979*. Washington, American Enterprise Institute for Public Policy Research, 1979. 436 pp.

Discusses recent developments in productivity. Authors include William Fellner, Herbert Stein, John W. Kendrick, Edward F. Dennison, and Mark Perlman (see separate entries).

2.21 Forrester, Jay W. "More Productivity Will Not Solve Our Problems." *Business and Society Review*, Fall, 1980, pp. 10–18.

Argues that productivity, because of underlying economic changes, rises and declines in cycles and long waves. Describes a model that sustains the argument. Also discusses the causes of inflation.

2.22 Rosow, Jerome M., ed. *Productivity: Prospects for Growth*. New York, Van Nostrand Reinhold, 1981. 340 pp.

Essays cover the relation between energy prices and productivity growth, international trade and productivity, productivity measurement, management roles, employee participation in productivity decisions, and related topics. (Individually annotated essays include those by Fabricant, Mark, Samuel, Oswald, Rosow, and Fraser.)

2.23 Fuchs, Victor R. *Economic Growth and the Rise of Services Employment*. Working Paper No. 486. Cambridge, Mass., National Bureau of Economic Research, June 1980. 30 pp.

Argues that, while the relative decline of agriculture is due mainly to differences in the income elasticity of demand, the shift from industry to services is attributable primarily to differential growth in output per worker.

2.24 Fulco, Lawrence J. "First-Quarter Productivity Drop Follows Marginal Growth in 1978." *Monthly Labor Review*, October 1979, pp. 57–61.

Reviews the trend labor productivity, a compensation and costs, and related variables in recent quarters. Details the trend in employee hours.

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2.25 Fulco, Lawrence J. "Long Nonfarm Productivity Slide Ends During the Third Quarter." *Monthly Labor Review*, March 1981, pp. 66–67.

Discusses recent trends in compensation, labor costs and profits, and employment and hours, all in relation to labor productivity.

2.26 Fulco, Lawrence J. "Productivity Declines Continue into Third Quarter 1979." *Monthly Labor Review*, February 1980, pp. 46–48.

Discusses economy the long-term trend in unit labor costs and unit profits (1959–78) in nonfinancial corporate business as well as recent developments in labor productivity in the business sector.

2.27 Fulco, Lawrence J. "Productivity Drops, Output and Hours Rise During the Fourth Quarter." *Monthly Labor Review*, June 1981, pp. 40–43.

In addition to trends in the private business sector and its components, discusses the relation of real compensation and productivity during the postwar period.

2.28 Fulco, Lawrence J. "Productivity Increased in All Major Sectors in the Third Quarter." *Monthly Labor Review*, February 1979, pp. 41–45.

In addition to recent trends in private-business labor productivity, discusses the divergence of trends in manufacturing and the remainder of the nonfarm business sector since 1975. Also examines trends in unit labor costs and compensation.

2.29 Fulco, Lawrence J. "Sixth Consecutive Productivity Drop Recorded During the Second Quarter." *Monthly Labor Review*, December 1980, pp. 52–54.

Analyzes the quarterly decline in labor productivity in the private business economy and its major components. Discusses trends in compensation, labor costs and profits. Also describes short-term trends in hours by economic sectors.

2.30 Gershuny, Jonathan. *After Industrial Society? The Emerging Self-Service Economy*. Atlantic Highlands, N.J., Humanities Press. 1978. 181 pp.

Evaluates recent major works by Daniel Bell, Rolf Dahrendorf, E.F. Schumacher and J. K. Galbraith on the evolution of industrial or post-industrial society. Argues that there is a shift to more goods consumption with self-service increasingly provided in the home. Also argues that satisfying work will be increasingly restricted to a professional and technical elite, but questions the inevitability of this perceived trend.

2.31 Goldsmith, Raymond W. *The National Balance Sheet of the United States, 1953–1980*. National Bureau of Economic Research Monography Series. Chicago, University of Chicago Press, 1982. 217 pp.

Presents annual estimates of national and sectoral balance sheets measuring U.S. economic and social performance. Introduces new concepts of national assets which allow for human capital and other assets. Presents interpretation and analysis.

2.32 Gollop, Frank M. "Dominant Sources of the Productivity Slowdown." Testimony. In U.S. House of Representatives. *Capital Formation and Industry Policy*. A Compendium of Papers Presented to the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce, July 1981. Washington, U.S. Government Printing Office, pp. 396–411.

Analyzes the growth in output during the postwar period by sector. Discusses the sources of sectoral productivity slowdown in the 1970's in terms of capital, labor, and other inputs.

2.33 Gordon, David M. "Capital-Labor Conflict and the Productivity Slowdown." *American Economic Review*, May 1981, pp. 30–35.

Develops a model of aggregate labor productivity and argues that the internal corporate apparatus of "bureaucratic control" which emerged after World War II has been eroded. Holds that the erosion accounts for almost all of the recent slowdown in productivity growth.

2.34 Gordon, Robert J. *The "End of Expansion" Phenomenon in Short-Run Productivity Behavior*. Working Paper No. 427. Cambridge, Mass., National Bureau of Economic Research, January 1980. 24 pp.

Explores the tendency for productivity to perform poorly in the last stages of the busi-

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ness cycle. Attributes this effect to inertia and over-optimism in business personnel policies.

2.35 Guither, Harold D. "Technology and the Improvement of Agricultural Productivity." In *The Five-Year Outlook, Problems, Opportunities, and Constraints in Science and Technology.* Vol. II. National Science Foundation. Washington, U.S. Government Printing Office, 1980, pp. 563–578.

Surveys the place of agriculture in the economy and discusses factors underlying agricultural productivity improvement. Stresses energy use and achievable efficiencies in energy.

2.36 Gustafson, Bo, ed. *Post-Industrial Society.* New York, St. Martin's Press, 1979.

Essay focus on the growth of the service industries, white-collar employment, and of public expenditures.

2.37 Hogan, John D. and Graig, Anna M., eds. *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980. Vols. 1 and 2, 1295 pp.

Compendia of papers focussing on the effects of the decline in productivity growth on employment, inflation, and international competitiveness; the secular nature of the decline; its causes; and needed research. Major topics covered include productivity in the national economy; microeconomic and managerial issues; international comparisons; and the role of government.

2.38 Iden, George; Phaup, Marvin; and Russek, Frank. *The Productivity Problem: Alternatives for Action.* U.S Congress, Congressional Budget Office, 1981. Washington, U.S. Government Printing Office. 137 pp.

The authors analyze reasons for the slowing of productivity growth and examine policies to reverse the trend.

2.39 Jackson, Grayson Jr., C. "The U.S. Economy and Productivity: Were Do We Go From Here?" In *Productivity: The Foundation of Growth.* Special Study on Economic Change, Vol. 10. U.S. Congress, Joint Economic Committee, December 29, 1980. Washington, U.S. Government Printing Office. pp. 18–45.

Discusses reasons for slowed productivity growth necessity of establishing more and detailed research findings. Surveys problems arising from inaction on. Presents data.

2.40 Joint Economic Committee, U.S. Congress. *The Economy of 1981. A Bipartisan Look. Proceedings of a Congressional Economic Conference, April 20, 1981.* Washington, U.S. Government Printing Office. 630 pp.

Includes proceedings of a seminar on productivity (entered separately under William S. Anderson, Jackson Grayson Jr., and Dale W. Jorgenson).

2.41 Joint Economic Committee, U.S. Congress. *The 1981 Midyear Report: Productivity.* July 23, 1981. Washington, U.S. Government Printing Office. 25 pp.

Summarizes reasons for productivity slowdown, presenting international comparisons. Offers recommendations to spur productivity growth.

2.42 Joint Economic Committee, U.S. Congress. *Productivity: The Foundation of Growth.* Special Study on Economic Change, Vol. 10. December 29, 1980. Washington, U.S. Government Printing Office. 128 pp.

Features studies of the determinants of the decline in productivity growth; the relation of productivity to inflation and growth; productivity measurement problems; ways to raise productivity; and the role of capital investments. (Some of the studies are separately listed and annotated.)

2.43 Jorgensen, Dale W. "Taxation and Technical Change." *In the Economy in 1981. A Bipartisan Look. Proceedings of a Congressional Economic Conference.* U.S. Congress, Joint Economic Committee, April 20, 1981. Washington, U.S. Government Printing Office, pp. 166–184.

Disaggregates growth in postwar output into the contributions of capital input, labor input, and rate of technical change. Finds the first to have been the most important contributor, followed by technical change and labor. Also probes reasons why technical change slowed in the recent decade by analyzing it at the sectoral level.

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2.44 Jorgenson, Dale W. "U.S. Productivity Growth: Retrospect and Prospect." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research*. The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 5-25.

Identifies factors of uncertainty in U.S. economic growth. Analyzes the slowdown in productivity growth. Traces the determinants of sectoral productivity growth, and discusses prospects.

2.45 Kendrick, John W. "Productivity Trends and the Recent Slowdown: Historical Perspective, Causal Factors, and Policy Options." In *Contemporary Economic Problems, 1979*. Washington, American Enterprise Institute for Public Policy Research, 1979, pp. 17-69.

Discusses the record and sources of productivity growth and projections to 1990. Interprets the slowdown in productivity growth in recent years and offers policy recommendations to overcome it.

2.46 Kendrick, John W. "Survey of Factors Contributing to the Decline in U.S. Productivity Growth." In *The Decline in Productivity Growth*. Conference proceedings. Boston, Federal Reserve Bank, 1980, pp. 1-25.

Presents a conceptual and analytical framework for tracing the growth in real gross product. Discusses such factors as the capital-labor ratio, technological change and knowledge, quality of labor, and resource reallocation. Includes a discussion by Lester C. Thurow.

2.47 Kindleberger, Charles P. "Historical Perspective on the Decline in U.S. Productivity." In *Dimensions on Productivity Research, Proceedings of the Conference on Productivity Research*. The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 715-724.

Discusses the notion of the climacteric in terms of innovation cycles and organizational practices in Great Britain. Surveys ideas of the aging process in investment decisions and institutional patterns. Also discusses concepts by Kondratieff and others.

2.48 Kutscher, Ronald E. and Mark, Jerome A. *The Service Sector in the United States*. Presented at the American Economic Association, December 30, 1982, New York, N.Y. 19 pp. (Subsequently published as "The Service-Producing Sector: Some Common Perceptions Reviewed." *Monthly Labor Review*, April 1983, pp. 21-24).

Analyzes output and employment growth and then discussses productivity in individual service industries. Also explores the difficulties of measuring output; surveys available measures. Addresses certain misperceptions concerning service productivity. Finds that the productivity slowdown has not been the result of the shift from goods- to service-producing industries.

2.49 Lu, Yao-chi and others. *Prospects for Productivity Growth in U.S. Agriculture*. Agricultural Economic Report No. 435. September 1979. Washington, U.S. Government Printing Office. 87 pp.

The authors discuss concepts and measurement, historical changes, and sources of change as well as the relation of research and extension services to agricultural productivity. Offers projections under various assumptions.

2.50 Maital, Shlomo and Meltz, Noah M., eds. *Lagging Productivity Growth: Causes and Remedies*. Cambridge, Mass., Harper & Row, 1980. 303 pp.

Research papers analyzing such subjects as historical trends in productivity, the use of gross output in productivity measurement, growth patterns in various industrial countries, trends in Canadian manufacturing, the question of the productivity slowdown in the 1970's, and company productivity.

2.51 Mark, Jerome A. *Developments in Productivity*. A paper presented before the World Trade Conference, Chicago, Ill., March 26, 1981. 16 pp.

Discusses the decline in productivity growth in recent years, and underlying reasons. Also discusses implications of productivity change for employment, emphasizing the link between the growth in both variables. Offers international comparisons.

2.52 Mark, Jerome A. "Measuring Productivity in Service Industries." *Monthly Labor Review*, June 1982, pp. 3-8.

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Surveys problems of measurement of output and input. Discusses existing or planned BLS measures for such industries as retail food stores, eating and drinking places, intercity trucking and buses, communications, banking, hotels and motels, and others.

2.53 Mark, Jerome A. "Productivity Trends and Prospects." In *Work in America. The Decade Ahead.* New York, Van Nostrand Reinhold/Work in America Institute Series, 1979, pp. 188–203.

Analyzes current and long-term trends in labor productivity. Examines some associated factors. Explores the outlook for these factors and their impact on future productivity growth.

2.54 Moomaw, Ronald L. "Productive Efficiency and Region." *Southern Economic Journal,* October 1981, pp. 344–357.

Finds that significant spatial variation in labor productivity exists even after adjusting for capital intensity. Shows that regions outside the South have a 6 to 8 percent productivity advantage relative to the South. Notes lower wages in the South in manufacturing offset this advantage.

2.55 Nadiri, M. Ishaq. "Sectoral Productivity Slowdown." *American Economic Review,* May 1980, pp. 349–352.

Investigates factors in different sectors that affected productivity growth during the post-World War II period and whether a weakening in these factors caused the recent productivity slowdown.

2.56 Nordhaus, William D. "Economic Policy in the Face of Declining Productivity Growth." *European Economic Review,* May/June 1982, pp. 131–157.

Reviews sources of the productivity slowdown after the mid-1960's, maintaining that only three-fifths of it can be accounted for statistically. Proposes a "depletion" hypothesis. Argues that the rate of savings should be reduced if the decline stems from slowed exogenous technological change.

2.57 Nordhaus, William D. "Policy Responses to the Productivity Slowdown." In *The Decline in Productivity Growth.* Conference proceedings. Boston, Federal Reserve Bank, June 1980, pp. 147–177. (Includes comments by Robert M. Solow.)

After examining the sources of the productivity slowdown, the author proposes a series of actions centering on anti-inflation policies, demand management, energy, and regulation.

2.58 Norsworthy, J.R., Harper, Michael J. and Kunze, Kent. "The Slowdown in Productivity Growth: Analysis of Some Contributing Factors." *Brookings Papers on Economic Activity,* 1979, pp. 387–421.

The authors analyze the underlying causes of the slowdown in productivity but limit discussion to causes which can be quantified and are adaptable to the national accounts framework. They examine changes in the growth of the capital-labor ratio, in the composition of capital, the effects of changes in labor force composition, and other factors.

2.59 Quinn, James Brian. "Overview of the Current Status of U.S. Manufacturing: Optimizing U.S. Manufacturing." *U.S. Leadership in Manufacturing.* A Symposium at the 18th Annual Meeting, November 4, 1982, National Academy of Engineering. Washington, National Academy Press, 1983, pp. 8–52.

Addresses the decline of U.S. manufacturing relative to other economic sectors, and to Japanese abilities, as exemplified by sales of Japanese automobiles and foreign trade trends. Discusses such factors as industry productivity, R&D expenditures, and plant and equipment investment. Also discusses management practices, including the recent emphasis on mergers. Presents various international comparisons. Presents programmatic recommendations.

2.60 Stanback, Thomas M., Jr. *Understanding the Service Economy. Employment, Productivity, Location.* Baltimore, Johns Hopkins, 1979. 122 pp.

Argues the close relation between services and manufacturing production. Surveys the demand for, productivity and employment in, and urbanization of services. Discusses future developments.

2.61 Stone, Richard. "Whittling Away at the Residual: Some Thoughts on Denison's

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Growth Accounting." *Journal of Economic Literature*, December 1980, pp. 1539–1543.

Discusses the framework of growth accounting. Offers criticism about the size of the drop in the contribution of Denison's residual to the productivity slowdown of the seventies. Believes much of the residual represents reduced work effort.

2.62 Striner, Herbert E. "Regaining the Lead in Productivity Growth." *National Productivity Review*, Winter 1981–82, pp. 5–11.

Identifies twelve critical factors to deal with improving productivity, among them more research and development, promoting innovations, more personal saving and investments, and smoother relations between governments and business.

2.63 Young, Paula C. and Loftus, Shirley F. *Summary Input-Output Tables of the U.S. Economy, 1973, 1974 and 1975.* BEA Staff Paper No. 37. Springfield, Va., National Technical Information Service, 1982. 95 pp.

The authors extend the input-output benchmark study for 1972 by the U.S. Department of Commerce's Bureau of Economic Analysis, and describe the statistical tables of their study.

Industry

3.1 Alim Marvasti, Farzim. *The Growth of Productivity in Electric Utilities.* Doctoral dissertation presented to Rensselaer Polytechnic Institute, 1979. 231 pp.

Investigates determinants of input productivity and the impact of demand upon them. Finds productivity growth in electric utilities to be demand induced, with expansion of physical investment rather than replacement being sensitive to demand.

3.2 Bailey, Martin Neil. "The Productivity Growth Slowdown by Industry." *Brookings Papers on Economic Activity*, 1982, pp. 423–456.

Examines the productivity slowdown by industry in terms of a postulated decline in capital services relative to capital stock, the possibility of a slower rate of technical change, increased cost of energy, and changes in the distribution of output and employment among industries.

3.3 Bank Administration Institute. *Total Bank Productivity Measurement: A Conceptual Framework*, Rolling Meadows, Ill., 1982. 61 pp.

Offers a method of productivity calculation applicable to a single bank and for interbank comparisons. Builds measurement around product lines and in physical-volume terms. Defines outputs as "corporate deliverables" to customers.

3.4 Barlow, Colin. *The Natural Rubber Industry: its Development, Technology, and Economy in Malaysia.* Oxford, Oxford University Press, 1978. 500 pp.

Reviews the history and technology of natural and synthetic rubber. Also examines the structure of the industry, its impact on resource allocation and competition with synthetic rubber.

3.5 Bascle, Barbara; Kassalow, Everett, and others. *The Coal Industry: Problems and Prospects. A Background Study.* Prepared for the Permanent Subcommittee on Investigations of the Committee on Governmental Operations, U.S. Senate, by Congressional Research Service, Library of Congress, December, 1978. Washington, U.S. Government Printing Office. 152 pp.

The authors survey production, technology, and labor in the coal industry. They also discuss the coal resources, the structure of the industry, and regulatory aspects.

3.6 Batie, Sandra and Healy, Robert G., eds. *The Future of American Agriculture as a Strategic Resource.* Washington, The Conservation Foundation, 1980. 291 pp.

Argues that excess capacity no longer is available in American agriculture, that technological advances may not overcome productivity lags from soil erosion, salinization, etc., that energy practices will increasingly impinge on production practices, and that monocultural production makes agriculture more vulnerable to future shocks.

3.7 Bays, C.W. "Utility Productivity and Regulatory Incentives." *Quarterly Review of Economics and Business*, Summer 1980, pp. 51–56.

Describes incentive schemes, based on indexes of productivity which have been instituted by various state utility commissions.

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Argues that the effect of these plans may be adverse because of the partial nature of the productivity measures. Proposes alternatives.

3.8 Bezold, Clement. *The Future of Pharmaceuticals: The Changing Environment for New Drugs.* New York, Wiley, 1981. 142 pp.

Reviews potential breakthroughs by the end of the century. Describes alternatives to current conventional forms of medicine. Examines the impact of government regulation. Discusses R & D, especially the role of recombinant DNA techniques.

3.9 Bingham, Barbara. *Labor and Material Requirements for Commercial Office Building Construction.* Bulletin 2102. Department of Labor, U.S. Bureau of Labor Statistics, March 1982. Washington, U.S. Government Printing Office. 50 pp.

Presents results of a survey and of employment impact of office building construction. Also describes recent trends in construction design, technology, and management. Discusses onsite and offsite hours of employment and various aspects of costs.

3.10 Bingham, Barbara. "Labor and Material Requirements for Commercial Office Building Projects." *Monthly Labor Review,* May 1981, pp. 41–48.

Summarizes findings from a survey of onsite and offsite labor requirements, costs, and technology of office building construction.

3.11 Bingham, Barbara. "Labor Requirements for College-Housing Construction." *Monthly Labor Review,* May 1979, pp. 28–34.

Traces declining onsite and offsite unit labor requirements in college-housing construction. Discusses costs per square foot, offering comparisons by type of project and region. Also surveys labor saving techniques and new technology.

3.12 Bingham, Barbara, and others. *Productivity Measure for Selected Industries, 1954–81.* Bulletin 2155. Department of Labor, U.S. Bureau of Labor Statistics, December 1982. Washington, U.S. Government Printing Office. 246 pp.

A compendium of measures of labor productivity and related variables, together with charts for a broad range of industries in mining, manufacturing, transportation, trade, finance, and services. Includes explanatory texts and a list of references. Published annually.

3.13 Bluestone, Barry, and others. *Aircraft Industry Dynamics: An Analysis of Competition, Capital, and Labor.* Boston, Auburn House, 1981. 208 pp.

The authors examine the industry's leadership in high technology, tracing its development. They review capital investment, labor supply, government relations, and other factors, finding the industry to have demonstrated great technological ingenuity.

3.14 Bluestone, Barry, and others. *The Retail Revolution: Market Transformation, Investment, and Labor in the Modern Department Store.* Boston, Auburn House, 1981. 160 pp.

The authors examine capital investment, expansion, the labor force, and productivity in the department store industry. Focuses on New England as representative of the national experience, finding that the "industrialization" of department stores has made them both more oligopolistic and competitive.

3.15 Boucher, Tom. "Technical Change, Capital Investment, and Productivity in U.S. Metalworking Industries." In *Aggregate and Industry-Level Productivity Analyses.* Ali Dogramaci and Nabil R. Adam, eds. Boston, Martinus Nijhoff, 1981, pp. 93–121.

After presenting calculations and data on productivity, the author discusses post-World War II developments in machine tool design, the economics of investment in machine tools, and the role of such recent innovations as numerical control.

3.16 Brand, Horst and Huffstutler, Clyde. "The Paper and Plastic Bag Industry: Two Distinct Productivity Phases." *Monthly Labor Review,* May 1980, pp. 26–30.

The authors discuss long- and medium-term trends in productivity, the long-term rise in output and demand, employment patterns, technological advances, and changes in product in the paper and plastic bag industry.

3.17 Brand, Horst and Duke, John. "Productivity in Banking: Computers Spur the Advance."

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Monthly Labor Review, December 1982, pp. 19–27.

Presenting a measure of labor productivity for commercial banking, the authors discuss how the measure was computed, trends in the output of banking services and in employment and skills, technological factors underlying productivity change, and the growth of branch banking.

3.18 Brand, Horst and Huffstutler, Clyde. "Productivity in the Pump and Compressor Industry." *Monthly Labor Review*, December 1982, pp. 38–45.

The authors discuss labor productivity in the pump and compressor industry, variations in productivity trend, and trends in output, employment, and manfacturing technology. They also discuss capital investment, changes in the structure of the industry, and other factors underlying productivity change.

3.19 Bright, Charles D. *The Jet Makers. The Aerospace Industry from 1945 to 1972.* Lawrence, Regents Press of Kansas, 1978. 228 pp.

Discusses, among other things, systems of production in the aerospace industry, demand, and costs. Presents a technological and economic history.

3.20 Brown, Eleanor F. *Cutting Library Costs. Increasing Productivity and Raising Revenues.* Metuchen, N.J., The Scarecrow Press, 1979. 264 pp.

Discusses cost reduction processes in various library activities, while maintaining needed services.

3.21 Bucklin, Louis P. *Productivity in Marketing.* Chicago, American Marketing Association, 1978. 117 pp.

Explores approaches to measurement of marketing productivity. Reviews productivity advance in various trade sectors and examines factors of productivity change.

3.22 Bunch, Snowden E. *Collection Quality and Museum Capacity as Determinants of Museum Visit Production. A Theoretical and Empirical Application of the Economics of Leisure and Recreation.* Doctoral dissertation submitted to the University of South Carolina, 1980. 128 pp.

Using a predictive model, the author relates the quality of exhibition and museum capacity to the quantity of visits. Argues that museum production is supplier-induced, since exhibition quality and capacity are under the supplier's control. Also holds that capacity, unless increased to relieve congestion, retards demand.

3.23 Carnes, Richard. "Productivity Trends for Intercity Bus Carriers." *Monthly Labor Review*, May 1981, pp. 23–27.

Discusses reasons for low productivity improvement in the bus transportation industry citing only modest advances in technology, declining passenger demand, and reduced speeds. Outlines employment trends and such influences upon productivity as declining capital investment.

3.24 Caves, Douglas W. *Measuring Productivity Growth in the U.S. Railroad Industry With an Estimate of Losses Resulting from Economic Regulation.* Doctoral dissertation submitted to the University of Wisconsin, 1980. 302 pp.

Assesses the effects of regulation on productivity in the U.S. railroad industry, comparing the industry with Canadian railroads which operated under decreasing regulation during the 1950's and 1960's. Improves index number measures of productivity by econometric estimates of cost elasticities. Finds higher productivity among Canadian than U.S. railroads.

3.25 Caves, Douglas W. and others. "U.S. Trunk Air Carriers, 1972–77: A Multilateral Comparison of Total Factor Productivity." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 47–76.

Compares the 11 U.S. trunk air carriers as to levels and rates of growth of output, input, and total factor productivity, finding wide variations between the carriers. They investigate reasons for these variations, finding that total factor productivity is positively related to output and load factor.

3.26 Comptroller General of the United States. *Amtrak's Productivity on Track Rehabilitation is Lower than Other Railroads' –Precise Com-*

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parison Not Feasible. March 13, 1981. Washington, General Accounting Office. 28 pp.

Compares three types of track upgrading among five railroads. Examines difficulties in such comparisons. Offers measurements of Amtrak track upgrading productivity finding them to be lower than for other railroad systems.

3.27 Comptroller General of the United States. *Low Productivity in American Coal Mining: Causes and Cures.* March 3, 1981, Washington, General Accounting Office. 151 pp.

Evaluates major factors in the decline of coal mining productivity. Finds them to be worsening labor-management relations, increased enforcement activity under the Federal Coal Mine Health and Safety Act, and slow technological advance.

3.28 Comptroller General of the United States. *New Strategy Required for Aiding Distressed Steel Industry.* Report to the Congress. January 8, 1981. Washington, General Accounting Office. 119 pp.

Analyzes the competitiveness of the U.S. steel industry and the risks of expanding capacity. Discusses obsolescence of steelmaking facilities, reasons for large imports of steel, and Government policies relating to steel.

3.29 Conners, Ronald B. *The Growth of Hospital Care.* Doctoral dissertation presented to the New School for Social Research, 1980. 230 pp.

Uses a growth accounting framework for measuring hospital inputs and outputs 1950–1976. Defines outputs in terms of patient days and outpatient visits. Develops a net capital stock series, as well as quality-adjusted labor inputs and nonlabor inputs. Offers measures of total factor productivity, showing a declining trend.

3.30 Cowing, Thomas G. "Comparative Measures of Total Factor Productivity in the Regulated Sector: The Electric Utility Industry." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 161–177.

The authors offer two alternative total factor productivity measures, one based on index number series, the other on estimated base-period cost functions. They show how the measures might be modified to account for capacity utilization, returns to scale, and rate-of-return regulation.

3.31 Crandall, Robert W. *The U.S. Steel Industry in Recurrent Crisis: Policy Options in a Competitive World.* Washington, Brookings Institution, 1981. 184 pp.

Identifies causes of the decline of the steel industry since 1960. Focusses on global diffusion of steelmaking technology, falling ore prices and shipping costs, and high U.S. wage rates. Argues for capital subsidies or inventory subsidies for new steel plants. Doubts that further capacity losses will exceed 10 percent during the 1980's.

3.32 Cremeans, J.E. "Productivity in the Construction Industry." *Construction Review,* May–June 1981, pp. 4–6.

In addition to discussing the trend in output per hour in construction, the author deals with possible errors in the measurement of output and of deflation, the deceleration in the growth rate of the capital-labor ratio, and other factors.

3.33 Crosson, Pierre R., ed. *The Cropland Crisis. Myth or Reality?* Baltimore, Johns Hopkins University Press, 1982. 250 pp.

A collection of papers examining the future adequacy of agricultural land in the United States, the growth in the demand for crop and animal production, technological change, and other topics. Stress is on technology as the key variable in ensuring adequacy of land.

3.34 Dougherty, Dawn. "Labor and Material Requirements for Hospital Construction." *Monthly Labor Review,* March 1982, pp. 34–37.

Summarizes findings from a survey of onsite and offsite employee hours required for hospital construction. Discusses project characteristics and costs. Also presents regional data.

3.35 Downing, Harry F. Jr. "Productivity and the Insurance Industry." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 1115–1120.

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Argues that misalignment of people and work, increased regulatory requirements, and competition compel productivity measurement in the industry.

3.36 Duke, John. "Construction Machinery Industry Posts Slow Rise in Productivity." *Monthly Labor Review*, July 1980, pp. 33–36.

Discusses long- and medium-term trends in labor productivity, as well as underlying factors such as technological improvements and capital investment. Also analyzes patterns of output and of employment.

3.37 Duke, John and Brand, Horst. "Cyclical Behavior of Productivity in the Machine Tool Industry." *Monthly Labor Review*, November 1981, pp. 27–34.

The authors discuss long- and medium term trends in productivity as well as output, patterns of output change, trends in employment and overtime, the diffusion of numerical controls and other technological advances, and the industry's capital stock.

3.38 Dwar, Margaret E., ed. *Industry Vitalization. Toward A National Industrial Policy.* New York, Pergamon Press, 1982. 252 pp.

A collection of papers dealing with such topics as industries in trouble (for example, steel, autos, men's clothing); effects of government policies on such industries as semiconductors, computers, and jet airliners; and industrial policy in Japan, West Germany, and Great Britain.

3.39 Farris, Mary K. and York, James D. "Hand and Edge Tools Industry Experiences Slow Rise in Productivity." *Monthly Labor Review*, October 1982, pp. 11–14.

The authors discuss factors underlying changes in labor productivity in the hand and edge tools industry. They analyze employment and output trends, as well as technological changes.

3.40 Fell, James E. *Ores to Metals: The Rocky Mountain Smelting Industry.* Lincoln, University of Nebraska Press, 1980. 341 pp.

Explores the sources of finance and technology of the Rocky Mountain smelting industry. Analyzes entrepreneurship and industrial structure in terms of the industry's growth.

3.41 Finn, Joseph T. *Labor and Material Requirements for Sewer Works Construction.* Bulletin 2003. Department of Labor, U.S. Bureau of Labor Statistics, 1979. Washington, U.S. Government Printing Office. 55 pp.

Examines onsite labor requirements by region, occupation, and apprentice hours, as well as offsite employee hours worked by employees of builders, as well as in pertinent manufacturing, trade and other nonconstruction industries. Investigates the distribution of contract costs, wages, and materials.

3.41 Frank, Robert H. "Productivity Gains Since Deregulation in the Airline Industry: A Survey of Research in Progress." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 1035–1054.

After discussing problems of measuring output, the author presents data on productivity improvement and analyzes reasons underlying it. He deals with administrative reforms, costs, pricing initiatives, quality of service, length of flight segments, capacity utilization, and other facets.

3.43 Friedman, Brian L. "Productivity Gains in the Drugstore Industry, 1958–79." *Monthly Labor Review*, November 1980, pp. 18–22.

Analyzes labor productivity trends in drug stores as well as improving technology and store operations. Also discusses industry structure, stressing the growth in the dominance of chain stores.

3.44 Gaden, Elmer L. Jr. "Production Methods in Industrial Microbiology." *Scientific American*, September 1981, pp. 181–196.

Describes conventional practices, the elements composing them, and variations in scales of production. Notes the prevalence of batch processing and examines in detail the advantages of continuous production.

3.45 Gold, Bela. "Frontiers of Productivity Analysis for Management: With Special Reference to Steel and other Manufacturing Industries." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 1159–1176.

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Finds a lack of adequate productivity measures among steel and other manufacturing firms and techniques to evaluate such measures. Outlines requirements for such measures, offers illustrations, and reviews problems of productivity improvement facing the steel industry.

3.46 Gollop, Frank M. and Roberts, Mark J. "The Sources of Economic Growth in the U.S. Electric Power Industry." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 107–143.

The authors develop a model to quantify the sources of growth of the industry including growth in the stocks of labor and capital, fuel inputs and fuel mix, gains from economies of scale, and technical change. They find a decline in the industry's overall productivity growth between 1958 and 1975, attributing it chiefly to lagging technical change, followed by lessening scale economies.

3.47 Gallop, Frank M. and Jorgenson, Dale W. "U.S. Productivity Growth by Industry, 1947–73." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. 44. Chicago, The University of Chicago Press, 1980, pp. 17–124.

The authors formulate a model of production and technical change permitting analysis of the sources of growth in output for individual industries and sectors. They present disaggregated measures of labor input, measures of output and intermediate inputs and then combine intermediate, labor, and capital inputs, together with outputs, to offer an index of productivity.

3.48 Greehan, R.R. and Allen, L.C. "Measuring the Real Output and Productivity of Savings and Credit Institutions." *Canadian Journal of Economics,* November 1978, pp. 669–679.

The authors develop indexes of real output, output per employee, and unit costs for 1961–75. They define output as the weighted sums of services performed, finding productivity to have risen at an average annual rate of 2.3 percent.

3.49 Greenberg, Leon. "Productivity Measurement in the Men's and Boys' Clothing Industry." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 423–443.

Evaluates pertinent statistics, evaluating the kinds of data available for an output measure. Discusses weighted production indexes, and deflated value of output. Also discusses labor input and capital input. Analyzes the feasibility of constructing an industry productivity measure, stressing the paucity of available price data to construct a deflated-value output measure.

3.50 Grinnell, Gerald and Friedman, Lawrence. *Productivity Potential in Dry Grocery Warehouses.* Agricultural Economic Report No. 484. Washington, U.S. Department of Agriculture, March 1982. 19 pp.

The authors discuss potential productivity from better use of existing technology, a more balanced daily workload, the use of new equipment, the increased use of unitized loads, and greater mechanization.

3.51 Gronau, Reuben. "Home Production—A Forgotten Industry." *The Review of Economics and Statistics,* August 1980, pp. 408–416.

Estimates the productivity and output of homes at the household level. Deals with factors underlying the wife's productivity in the home, the value of home production, socioeconomic differences in home output, and other variables. Discusses alternative approaches to household productivity measurement.

3.52 Henneberger, J. Edwin. "The Office Furniture Industry: Patterns in Productivity." *Monthly Labor Review,* December 1982, pp. 33–37.

Presents a measure of labor productivity for the industry and discusses variations in productivity trends, trends in the demand for office furniture and employment, establishment size, innovations in the manufacture of office furniture, and other factors underlyig productivity change.

3.53 Herman, Arthur S. "Productivity Declined in 1980 in Most Industries Measured." *Monthly Labor Review,* May 1982, pp. 36–39.

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Presents data on changes in labor productivity in selected industries and discusses trends, 1975–80.

3.54 Herman, Arthur S. "Productivity Increased in 1981 in Most Industries Measured." *Monthly Labor Review*, December 1982, pp. 15–18.

Presents data on changes in labor productivity in selected industries, emphasizing trends between 1976 and 1981.

3.55 Herman, Arthur S. "Productivity Increased in 1978 in Most Industries Measured." *Monthly Labor Review*, January 1980, pp. 40–43.

Presents data on changes in labor productivity in selected industries and discusses trends, 1973–78.

3.56 Herman, Arthur S. "Productivity Slows or Drops in 1979 in More than Half of Industries Measured." *Monthly Labor Review*, April 1981, pp. 58–61.

Outlines recent labor productivity trends in industries for which the BLS calculates measures. Discusses year-to-year developments as well as 1974–79 trends.

3.57 Herman, Arthur S. and Ferris, John W. "Productivity Growth Average in Farm Machinery Manufacturing." *Monthly Labor Review*, October 1982, pp. 6–10.

The authors discuss factors underlying changes in productivity in the farm machinery industry. They relate output and productivity to changes in farm income and analyze the structure of the industry, technological trends, and employment and hours.

3.58 Kerr, Arnold D and Kornhauser, Alain L., ed. *Productivity in U.S. Railroads*. Proceedings of a symposium held at Princeton University, July 27–28, 1977. New York, Pergamon Press, 1980. 143 pp.

The authors discuss such subjects as the relation of work rules to productivity, the productivity of track rehabilitation, equipment utilization and productivity, and intermodal cooperation and competition.

3.59 Lange, Julian E. and Mills, Daniel Q., eds. *The Construction Industry: Balance Wheel of the Economy*. Lexington, Mass., D.C. Heath, 1979. 205 pp.

In addition to technology, the authors discuss pricing, labor relations, and financing in the industry.

3.60 Lewin, Wayne B. "Productivity and the Banking Industry." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research*, The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 1177–1183.

Discusses the impact of noninterest operating expenses and its significance for productivity in transactions processing, human resources, and government regulations.

3.61 Lynch, Jean M. *Maximizing Productivity in 32 Black Graduate Schools*. Prepared for the U.S. Office of Education, Department of Health, Education, and Welfare. Washington, September 1978. 154 pp.

Provides data on the student body, faculty, programs, and resources of schools examined. Examines the contribution of black institutions to graduate degree conferrals, and presents comparisons with white institutions. Views productivity in terms of blacks' graduate study needs and black graduate schools' ability to meet such needs.

3.62 McGuckim, Robert H. and Winkler, Donald R. "University Resources in the Production of Education." *The Review of Economics and Statistics*, May 1979, pp. 242–248.

The authors postulate student choice in the maximization of educational attainment within the university. They find that university resource inputs are largely determined by student choice.

3.63 MacAuley, Patrick H. "Economic Trends in the Construction Industry, 1965–80." *Construction Review*, May–June 1981, pp. 7–18.

Reviews output and employment trends as well as costs. Discusses productivity trends and factors underlying them.

3.64 Murphy, Martin. "Comparative Estimates of the Value of Household Work in the United States for 1976." *The Review of Income and Wealth*, March 1982, pp. 29–43.

Derives aggregate and per-person estimates. Explores the relation between the two, as well as variations in per-person estimates by age and sex. Finds aggregates to be highly

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sensitive to the method of valuation, but of large size, no matter what method is used.

3.65 Nadiri, M. Ishaq and Schankerman, Mark A. "The Structure of Production, Technological Change, and the Rate of Growth of Total Factor Productivity in the U.S. Bell System." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 219–247.

The authors analyze the production structure of the Bell System, focusing upon patterns of input factor substitution and economies of scale. They explore the role of R&D as an input and its interaction with traditional inputs. They also study the impact of technological change on the production structure, as well as the interrelation between scale economies and external technical change.

3.66 Nickless, P.J. "A New Look at Productivity in the New England Cotton Textile Industry, 1830–1860." *Journal of Economic History*, December 1979, pp. 889–910.

Examines changes in labor quality to determine sources of productivity advance, hitherto held not to be due to technological innovations. Casts doubt on the belief that technology stagnated and shows that the capital-labor ratio rose.

3.67 Olsen, John G. *Labor and Material Requirements for Elementary and Secondary School Construction.* Springfield, Va., National Technical Information Service, February 1981. 47 pp.

Analyzes and presents data on employment requirements by occupation, type of contractor, and on costs and material requirements.

3.68 Olsen, John G. "Labor and Material Requirements for Elementary and Secondary School Construction." *Monthly Labor Review*, April 1979, pp. 38–41.

Summarizes findings from a survey of employment requirements by occupation, material requirements, and distribution of costs by major components.

3.69 Olsen, John G. "Labor and Material Requirements for Federal Building Construction." *Monthly Labor Review*, December 1981, pp. 47–51.

Discusses onsite and offsite employment effects and requirements. Analyzes distribution of costs by major components.

3.70 Otto, Phyllis Flohr. "Productivity Growth Below Average in Fabricated Structural Metals." *Monthly Labor Review*, June 1980, pp. 27–31.

Analyzes long- and medium-term trends in labor productivity and reasons for the decline in industry productivity. Examines factors underlying productivity change, especially improvements in technology and capital investment. Discusses automation and computers in the industry and surveys employment patterns.

3.71 Otto, Phyllis Flohr. "Transformer Industry Productivity Slows." *Monthly Labor Review*, November 1981, pp. 35–39.

Discusses long-term trends in labor productivity, output and employment, as well as fluctuations in the trends and reasons for them. Also discusses advances in technology and patterns of capital expenditures.

3.72 Pauly, Mark V. *Doctors and Their Workshops.* Chicago, University of Chicago Press, 1980. 144 pp.

Investigates the effects of physician input on hospital productivity. Explores how doctors, as providers of some elements of medical care, affect the productivity of other providers.

3.73 Persigehl, Elmer S. and York, James D. "Substantial Productivity Gains in the Fluid Milk Industry." *Monthly Labor Review*, July 1979, pp. 22–27.

The authors analyze long-term, as well as medium-term productivity trends, changes in production patterns, reasons for employment declines, extensions of plant scale, and technological advance. They project continued gains in productivity.

3.74 Prier, Rober J. "Labor and Material Requirements for Federally Aided Highways." *Monthly Labor Review*, December 1979, pp. 29–34.

Discusses reasons for increased unit labor requirements after 1973. Provides data for onsite and offsite labor requirements, by type of operation. Surveys technological changes,

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usage of machinery, and methods of construction.

3.75 Prier, Robert J. "Labor Requirements Decline for Public Housing Construction." *Monthly Labor Review*, December 1980, pp. 40–44.

Analyzes and presents survey data for onsite and offsite spending for public housing construction, its employment impacts, and material requirements. Also discusses distribution of costs, and type of contractor.

3.76 Rittenberg, Libby T. *The Coal Mining Industry. A Case Study of Decline in Labor Productivity.* Doctoral dissertation submitted to Rutgers University, The State University of New Jersey, 1980. 288 pp.

Derives productivity equations from a model of an aggregate production function. Calculates the equations for both underground and surface mining, relating productivity to a variety of factors, including marketing conditions, geological conditions, and technological change. Finds that the rise in the selling price of coal relative to the price of labor explains a significant part of the productivity decline, as do strengthened reclamation laws.

3.77 Roberts, Mark J. *Essays on the Sources of Productivity Growth.* Doctoral dissertation submitted to the University of Wisconsin-Madison, 1980. 204 pp.

Measures anual rates of total factor productivity growth in a group of electric utility firms, 1958–75. Identifies economic and technical forces which underly productivity change. Also discusses recent advances in productivity research. Finds that declining scale and technical contributions largely account for declining productivity growth trends in the industry.

3.78 Schwartz, Samuel. "Productivity in the Energy-Producing Industries." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 191–197.

Presents labor productivity measures for components of energy-producing industries and discusses factors affecting productivity. States that technological improvement is most frequently mentioned by producers as spurring productivity.

3.79 Stokes, H. Kemble Jr. "An Examination of the Productivity Decline in the Construction Industry." *The Review of Economics and Statistics*, November 1981, pp. 495–502.

Examines reasons for the decline including shifts in output composition, changes in capital per worker, demographic changes in the workforce, changing economies of scale, regional shifts, changes in work rules, and measurement problems. Finds only a small part of the deterioration in productivity to be explained by these factors.

3.80 Tenenbaum, Bernard W. *The Measurement of Relative Productive Efficiency among Privately Owned Electric Utilities.* Doctoral dissertation submitted to the University of California, Berkeley, 1980. 338 pp.

Investigates the effect of competition and regulation on productive efficiency. Examines static and dynamic efficiency. Determines whether efficiency assessments can be incorporated in the regulatory process. Finds that cost reduction efforts are influenced by competition and regulation and that the TVA provides standard against which to measure costs, thus stimulating efficiency efforts.

3.81 Tretheway, Michael W. *Productivity Growth and Returns to Scale in the U.S. Trunk Airlines Industry, 1972–78.* Doctoral dissertation submitted to the University of Wisconsin-Madison, 1981. 243 pp.

Estimates total factor productivity, finding that growth in such productivity correlates with growth in output. Argues that exploitation of scale economies is an important source of total factor productivity.

3.82 Ullmann, John E., ed. *The Improvement of Productivity. Myths and Realities.* New York, Praeger, 1980. 328 pp.

The authors discuss productivity trends in a wide range of industries. Generally, they find that productivity advance has stemmed from increasing economies of scale rather than from qualitative improvement of production facilities.

3.83 Vastola, S.J. Jr. "Producitivity and the Petroleum Industry." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Pro-

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ductivity Center, Houston, Texas, April 21–24, 1980, pp. 1133–1146.

Reveiws the impact of changing inputs on the industry's productivity. Stresses changes in raw material quality, improvements in labor productivity, improved technology as embedded in new capital investment, energy conservation, and intensified government regulation.

3.84 Veigle, Jack and Brand, Horst. "Millwork Industry Shows Slow Growth in Productivity." *Monthly Labor Review*, September 1982, pp. 21–26.

The authors analyze the long- and medium-term trend in labor productivity, as well as the forces underlying that trend. They discuss patterns of output and demand for the industry's products, employment, technological advances, and capital expenditures.

3.85 Wiederhorn, Robert. "Productivity and the Petrochemical Industry." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 1153–1157.

Reviews factors underlying productivity improvement in the industry, but emphasizes slowdown since 1973.

3.86 Wilder, Patricia A. "Cosmetics Industry Achieves Long-Term Productivity Gains." *Monthly Labor Review*, December 1982, pp. 28–32.

Discusses trends in output, employment, plant size, technological advances, and other factors underlying productivity change in the cosmetics industry.

3.87 Wilder, Patricia S. "The Productivity Trend in the Soaps and Detergents Industry." *Monthly Labor Review*, February 1980, pp. 26–30.

Discusses long- and medium-term trends in productivity, reasons for the doubling of output over the period studied, the moderate rise in employment, the scale of production in leading plants, and changes in technology.

3.88 York, James D. "Folding Paperboard Box Industry Shows Slow Rise in Productivity." *Monthly Labor Review*, March 1980, pp. 25–28.

Analyzes long- and short-term trends, in labor productivity and underlying factors such as technological improvements. Discusses changes in product and market patterns, and examines the decline in industry employment.

3.89 York, James D. "Nonwool Yarn Mills Experience Slow Gains in Productivity." *Monthly Labor Review*, March 1982, pp. 30–33.

Discusses long-term trends in labor productivity and the forces underlying its improvement, including advances in technology and capital investment. Analyzes employment patterns and output. Notes an acceleration of productivity for 1972–80.

3.90 York, James D. and Persigehl, Elmer S. "Productivity Trends in the Ball and Rolier Bearing Industry." *Monthly Labor Review*, January 1981, pp. 40–43.

The authors outline long- and medium-term labor productivity trends, analyzing factors underlying industry productivity change including improved technology. They also discuss changing patterns in industry markets as well as in employment.

Public sector

4.1 Ardolini, Charles W. "Federal Sector Productivity Measurement." *Selected Papers from North American Productivity Conference on Labor Statistics*, Boston, Mass., June 18–21, 1979. Washington, U.S. Department of Labor, May 1980, pp. 49–53.

Reports on Federal Government output indicators supplied to the BLS for calculating labor productivity. Discusses problems and limitations of output concepts and measures, and cites some findings. Outlines future efforts.

4.2 Assaley, Lewis A. *Police Productivity: A Value and Cost Analysis.* Doctoral dissertation presented to the University of Cincinnati, 1979. 128 pp.

Seeks to develop a method by which municipal administrators may evaluate alternate ways of providing police services. Formulates a value-to-cost framework, imputing a dollar value to each service. Notes the influence of

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changing modes of police services and discusses methods of addressing this problem.

4.3 Bryant, Stephen. *DOD's Productivity-Enhancing Incentive Funds Program.* Washington, Office of Personnel Management, August 1980. 19 pp.

Discusses uses and productivity effects of small equipment purchases, and evaluates the program's implications for Federal productivity in general. Argues for a larger role of capital investment in Federal productivity.

4.4 Bryant, Stephen and Field, Cynthia. *HUD's Performance Improvement Project. Improving Productivity of Financial and Accounting Employees.* Washington, Office of Personnel Management, August 1980. 15 pp.

The authors describe a 4-step process to reduce backlogs and clerical errors, with improvements noted in training, analysis, feedback and "positive reinforcement." They discuss results.

4.5 Buntz, Gregory C. "Problems and Issues in Human Service Productivity Improvement." *Public Productivity Review,* December 1981, pp. 299–320.

Defines productivity and outlines its determinants and measurement. Discusses approaches to overcoming conflicts introduced by improvements in human service programs.

4.6 Bush, Clesson S. "Productivity in Social Services. Title XX as a Measurement Device." *Public Productivity Review,* December 1982, pp. 268–275.

Examines concepts of productivity measurement for social services and their limitations. Investigates the feasibility of using the Title XX framework as productivity criterion.

4.7 Campbell, Alan K. "Government and Productivity." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 941–952.

Discusses productivity measurement problems in the public sector and some of the functional and organizational obstacles to effective measurement. Also deals with incentives.

4.8 Comptroller General of the United States. *Improved Work Measurement Programs Would Increase DOD Productivity.* Washington, U.S. General Accounting Office, June 8, 1981. 40 pp.

The authors, while recognizing Department of Defense efforts to measure internal productivity, criticize the widespread use of nonengineered standards in DOD facilities, inadequate monitoring, lack of qualified work measurement personnel, lack of consistent management support, and other inadequacies in the programs of the military services.

4.9 Comptroller General of the United States. *Military Standard on Work Measurement—a Way to Control Cost and Increase Productivity.* Report to the Congress. Washington, U.S. General Accounting Office, June 3, 1980. 23 pp.

Describes and explains a contractual work measurement requirement imposed by the Air Force to increase efficiency and reduce costs in the production of weapons systems.

4.10 Comptroller General of the United States. *Millions Can Be Saved by Improving the Productivity of State and Local Governments Administering Federal Income Maintenance Assistance Programs.* Washington, U.S. General Accounting Office, June 5, 1981. 69 pp.

The authors argue the need for more efficient operating procedure in the administration of unemployment insurance, aid to families with dependent children, and food stamps. They criticize Federal methods of distributing funds to the States for not encouraging and rewarding productivity improvements.

4.11 Ehrenberg, Ronald G. and Schwarz, Joshua L. *The Effect of Unions on Productivity in the Public Sector. The Case of Libraries.* Working Paper No. 717. Cambridge, Mass., National Bureau of Economic Research, July 1981. 30 pp.

The authors formulate a framework for measuring public-sector productivity, applying concepts and data developed for library productivity.

4.12 "Federal Agencies Updating Base Year of Indexes to 1977." *Monthly Labor Review,* February 1981, pp. 75–76. (No author indicated.)

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Presents schedules for the base year conversion of Federal data series and offers reasons for the choice of certain calendar years as base years.

4.13 Fisk, Donald M. "Pilot Study Measures Productivity of State, Local Electric Utilities." *Monthly Labor Review*, December 1981, pp. 45–47.

Discusses pertinent trends in labor productivity from 1967 to 1978 and reasons underlying output growth. Analyzes market shares and presents comparisons with output and productivity in private utilities.

4.14 Getz, Malcolm. *The Economics of Urban Fire Departments*. Baltimore, The Johns Hopkins Press, 1979. 230 pp.

Analyzes the allocation of resources in a large number of central city fire departments. Examines the impact of factor prices and city characteristics. Formulates output concepts and relates them to certain inputs to arrive at a measure of efficiency. Also investigates the impact of technological changes.

4.15 Greenfield, Stuart J. "Audit Productivity: A Cross-Sectional Analysis." *National Tax Journal*, December 1982, pp. 501–505.

Investigates audit performance among States having a sales tax, to determine factors which contribute to increased audit collections. Reviews the pertinent literature.

4.16 Hatry, Harry P. "Performance Measurement Principles and Techniques: An Overview of Local Government. "*Public Productivity Review*, December 1980, pp. 312–339.

Examines principles and techniques to evaluate government service delivery systems. Discusses criteria for various measures together with data collection procedures. Shows how to assess performance based on the measure discussed.

4.17 Hatry, Harry, P. and others. *Efficiency Measurement for Local Government Services. Some Initial Suggestions*. Washington, Urban Institute, 1979. 204 pp.

The authors analyze efficiency measurement in water supply operations, police apprehension of criminals, purchasing, and group residential care of children. They also discuss cost estimation issues, focusing on direct labor and the treatment of capital expenditures.

4.18 Highsmith, Robert J. *An Economic Inquiry into the Production and Distribution of Police Services*. Doctoral dissertation presented to Indiana University, 1978. 204 pp.

Investigates the efficiency of the Baltimore Police Department. Uses inputs, such as the number of beats, outputs such as victimizations, noncrime related service calls and patrol. Finds negative effects of police activities on final outputs, and develops an efficiency standard for the distribution of police services.

4.19 Leitch, John A. "Other Public Productivity Measurement—State and Local." *Selected Papers from North American Conference on Labor Statistics*, Boston, Mass., June 18–21, 1979, Washington, U.S. Department of Labor, May 1980, pp. 54–60.

Notes the need for State and local productivity measures and reports on a GAO study of the Federal role in compiling such measures. Notes large differences in State and local performance of the same functions as measured by productivity. Discusses extent of State and local measurement effort.

4.20 McGowan, Robert P. "Productivity and Performance Indicators in State Human Service Agencies." *Public Productivity Review*, December 1981, pp. 355–379.

Examines characteristics of State human service agencies, focusing on New York. Finds that active participation in decisionmaking improved productivity and work performance.

4.21 Mark, Jerome A. "Measuring Federal Productivity." *Civil Service Journal*, January–March 1979, pp. 20–23.

Surveys concepts and measures of labor productivity. Discusses measurement problems encountered in conceptualizing and calculating productivity in Federal agencies and functions.

4.22 Mark, Jerome A. "Measuring Productivity in Federal, State and Local Government." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research*. The American Productivity Center,

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Houston, Texas, April 21–24, 1980, pp. 993–1011.

After defining productivity in the public sector, the author discusses the Federal productivity measurement system of the Bureau of Labor Statistics. He discusses output and input (employee-years) indicators. He also deals with efficiency and effectiveness measures, productivity measurement at the State and local government levels, and outlines future directions.

4.23 Mark, Jerome A. "Measuring Productivity in Government—Federal, State and Local." *Public Productivity Review*, March 1981, pp. 21–44.

Discusses different types of productivity measures, describes productivity measurement at the Federal level, the methods and procedures for arriving at output measures of specific functions, and the problems encountered. Also discusses measurement efforts by agencies other than the BLS, and then deals with productiviy measurement at the State and local level, stressing problems of data availability.

4.24 Mroczko, Thomas. *Productivity Achievements at USDA's National Finance Center.* Washington, U.S. Office of Personnel Management, September 1980. 23 pp.

Discussess approaches used to improve productivity, such as automation of payments to gasoline venders from credit card purchases, the use of a central accounting system, and the use of sampling of vouchers for audit. Also discusses processing systems and procedures and results of the program.

4.25 Mroczko, Thomas and Northcutt, Malthus. *The San Antonio Air Logistics Center's Productivity Improvement Program: Improvements in Equipment Maintenance.* Washington, U.S. Office of Personnel Management, May 1980. 24 pp.

The authors describe approaches used in achieving higher productivity, including higher labor standards, improved work environments, projects demonstrating feasible productivity improvements, and awards and suggestions programs.

4.26 Udler, Allan S. and Monte-White, Kay. *Measuring Common Administrative Services. Assessing Productivity of Operating Personnel Offices.* Washington, U.S. Office of Personnel Management, April 1980. 29 pp.+appendixes.

The authors describe current measurement programs and details the measurement system by function. They also discuss a prototype system and ways of ensuring its accuracy.

4.27 U.S. General Accounting Office. *Improved Productivity Can Reduce the Cost of Administering Veterans Benefit Programs.* Washington, December 22, 1982. 27 pp.

Examines the claims processing function of the Veterans Administration involving such benefits as disability, burials, pensions, and education. Finds overstaffing and addresses its budgetary implications. Also deals with reasons why a tendency to overstaffing has persisted.

4.28 U.S. General Accounting Office. *Improving Productivity in Copyright Registration.* Washington, October 22, 1982. 22 pp.

Notes tripling of minimum time needed to register a claim since 1956. Reviews past recommendation for productivity improvement. Holds current work flow to be inefficient, partly because of too much time spent on correspondence. Offers suggestions for improvement.

4.29 U.S. General Accounting Office. *Navy Missile Maintenance Can Be Done Cheaper by Improving Productivity.* Report to the Secretary of the Navy. Washington, April 9, 1980. 37 pp.

The authors recommend reducing intermediate missile maintenance resources to improve worker efficiency and facility utilization.

4.30 U.S. Office of Personnel Management: *Federal Productivity Measurement: A Report and Analysis of FY 1979 Data.* Washington, February 1981. 241 pp.

Reports continued improvement in labor productivity in the Federal Government sector. Discusses how productivity in this sector is measured and scope of measurement. Analyses factors underlying trends.

4.31 U.S. Office of Personnel Management. *Measuring Federal Productivity: A Report and*

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Analysis of the FY 78 Productivity Data. Washington, June 1980. 218 pp.

After discussing reasons for and methods of productivity measurement, the authors discuss trends and present analyses by functional category.

4.32 Washnis, George J., ed. *Productivity Improvement Handbook for State and Local Government.* New York, John Wiley & Sons, 1980. 1492 pp.

Presents essays on the organization and implementation of productivity systems, techniques for measuring and improving productivity, technology and capital investments which raise productivity, and related topics. Also features essays on productivity improvements in such State and local sectors as public works, public safety, health, education, and financial management.

International

5.1 Agarwal, J.P. "Productivity of Foreign and Domestic Firms in Indian Industries." *Weltwirtschaftliches Archiv,* 1979, pp. 116–157.

Presents statistical comparisons for 3-digit industries and the manufacturing sector as a whole. Finds foreign firms to be more productive.

5.2 Atkinson, Thomas R. "The Role of Productivity in International Trade." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 647–665.

Compares the relation between productivity and trade at the macroeconomic level in several countries. Analyzes the pertinent variables for the motor vehicle industry.

5.3 Ball, John M. and Skeoch, N.K. *Inter-Plant Comparisons of Productivity and Earnings.* Working Paper No. 38. London, U.K. Department of Employment, Unit for Manpower Studies, 1981. 138 pp.

The authors report on the variations in productivity, plant size, and earnings in 15 U.K. industries. Among their findings is that productivity increases with plant size and with the proportion of technical, administrative, and clerical staff in the workforce.

5.4 Bernhardt, Irwin. "Sources of Productivity Differences Among Canadian Manufacturing Industries." *The Review of Economics and Statistics,* November 1981, pp. 503–512.

Compares Canadian industry productivity differences with their U.S. counterparts. Examines structural productivity variables (for example, market size, technological activity), as well as behavioral variables (for example, plant size, capital-labor ratios). Finds technological activity in U.S. counterpart industries to be negatively associated with Canadian productivity differences, owing to the effects of Kennedy Round tariff cuts.

5.5 Bhaskar, Krish. *The Future of the World Motor Industry.* New York, Nichols, 1980. 385 pp.

Emphasizes the global nature of supply and demand in the motor vehicle industry. Analyzes the industry's current status and its economic importance. Examines major and minor markets. Argues for the intensification of technological developments as the industry becomes more concentrated and profits become scarcer.

5.6 Omitted

5.7 Capdevielle, Patricia and Alvarez, Donato. "International Comparisons of Trends in Productivity and Labor Costs." *Monthly Labor Review,* December 1981, pp. 14–19.

The authors report on the slowdown in manufacturing productivity in the preceding year, the acceleration of unit labor costs, and the downturn in output in the United States and other major industrial countries. They also discuss trends in hourly compensation.

5.8 Capdevielle, Patricia and Daly, Keith. *International Comparisons of Manufacturing Productivity and Labor Costs: 1978.* Summary 80–1. February 1980. 6 pp.

A report on productivity, output, employment, and hours in major industrial countries. Discusses hourly compensation and labor and costs and makes year-to-year as well as recent medium-term comparisons.

5.9 Capdevielle, Patricia and others. "International Trends in Productivity and Labor Costs." *Monthly Labor Review,* December 1982, pp. 3–14.

The authors discuss recent changes in labor productivity in industrial countries as well as

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trends in output, employment, hours, and unit labor costs.

5.10 Caves, Richard E. and Krause, Lawrence B., eds. *Britain's Economic Performance.* Washington, Brookings Institution, 1980. 388 pp.

A collection of research papers examining, among other things, the causes of low productivity in different industries. Presents hypotheses attempting to explain the causes.

5.11 Christensen, L.R. and others. "Relative Productivity Levels, 1947–1973: An International Comparison." *European Economic Review,* May 1981, pp. 61–94.

The authors compare levels of output, capital inputs, labor inputs, and "total factor productivity" between the United States and eight of her major trading partners. They argue that differences in the levels of real input per capita are more important than differences in productivity in explaining differences in output per capita across countries.

5.12 Christiansen, Jens P. *Labor Productivity in the Steel Industry. A Comparative Study of the Federal Republic of Germany and the United States of America.* Doctoral dissertation submitted to Stanford University, 1982. 263 pp.

Holds that the differences in productivity between the steel industries of the United States and West Germany are not the result of differences in technology. Argues that labor relations is of major importance in explaining differences, finding American labor to have been much less cooperative than German.

5.13 Church, Roy. *Herbert Austin: The British Motor Car Industry to 1941.* London, Europa Publications, 1979. 233 pp.

Deals with the difficulties of the British automobile industry in terms of the biography of one of its major figures.

5.14 Connidis, Imgegjerd L.A. *The Canadian Motor Vehicle Assembly Industry. A Study of Protection and Productivity under the Auto Pact.* Doctoral dissertation presented to Queen's University at Kingston, 1979. No pp. indicated.

Estimates labor and capital productivity ratios in the Canadian and U.S. auto industries to determine whether comparisons reveal inefficiencies in the Canadian industry supporting the need for protection. Finds no need for the Canadian industry to be protected by content requirements or tariffs higher than those in the U.S. Analyzes facets of protection and export-import decisions.

5.15 Daly, A. and Jones, D.T. "The Machine Tool Industry in Britain, Germany, and the United States." *National Institute Economic Review,* May 1980, pp. 53–63.

The authors contrast the productivity and technology of the British machine tool industry with those of Germany and the United States, finding lags since before World War II. They consider deficiencies in British technical skills.

5.16 Dawson, John A. *Commercial Distribution in in Europe.* New York, St. Martin's Press, 1982. 244 pp.

Examines changes in technique, organization, and environment of Western European distributive trades. Discusses changing consumer patterns. Also analyzes the impact of service industries on the functions of retailers and wholesalers.

5.17 Denny, Michael and others. "Intertemporal Changes in Regional Productivity in Canadian Manufacturing." *Canadian Journal of Economics,* August 1981, pp. 390–408.

The authors investigate rates of growth in total factor productivity in 2-digit manufacturing industries, 1961–1975. They find efficiency levels in Ontario to run somewhat higher than in other provinces and narrower differentials for the Atlantic provinces which experienced less of a productivity slowdown in the 1970's.

5.18 Gold, Bela. "Pressures for Restructuring the World Steel Industry in the 1980s: A Case Study in Challenges to Industrial Adaptation." *Quarterly Review of Economics and Business,* Spring 1982, pp. 45–66.

Analyzes the pressures on the steel industry in terms of resources, technology, and product markets. Examines the adjustments underway.

5.19 Gray, Alastair McI. "The Production of Dental Care in the British National Health Service." *Scottish Journal of Political Economy,* February 1982, pp. 59–74.

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Examines earnings, output, productivity, and underlying determinants, of the British dental care system.

5.20 Grayson, C. Jackson Jr. "Productivity, National Economic Growth and the U.S. Status in an Increasingly Competitive World: Realities and Policy Options." Joint Economic Committee, U.S. Congress. *The Economy of 1981. A Bipartisan Look.* Proceedings of a Congressional Economic Conference, December 10, 1980. Washington, U.S. Government Printing Office, April 20, 1981, pp. 127–144.

Examines the disparity in productivity growth between the United States and its leading international trade competitors. Surveys postwar tendencies in saving and consumption. Argues against the adversary relationship between government, management, and labor.

5.21 Guill, Gene D. *Structural Change in the Soviet Economy.* Doctoral dissertation presented to Duke University, 1979. 415 pp.

Finds, on the basis of input-output tables from Soviet and Western sources, that labor productivity in the Soviet Union rose during the 1959–72 period, but capital productivity dropped, reflecting declining growth in the Soviet labor force and high investment levels.

5.22 Hayami, Yujiro and others, eds. *Agricultural Growth in Japan, Taiwan, Korea and the Philippines.* Honolulu, University of Hawaii Press, 1979. 404 pp.

A collection of research studies, presenting information on the long-term growth of agricultural output, inputs, and productivity. Three measures of productivity emphasized: Total factor, land, and labor.

5.23 Ibielski, Dieter. "Productivity Research in the Federal Republic of Germany." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 685–698.

Presents organizational details of productivity research. Describes economic background. Discusses factors in productivity improvement.

5.24 Jones, D.T. and Prais, S.J. "Plant Size and Productivity in the Motor Industry: Some International Comparisons." *Oxford Bulletin of Economics and Statistics,* May 1978, pp. 131–151.

The authors treat aspects of the subject historically and discuss the roles of capital expenditures, instability of demand, and strikes.

5.25 Kendrick, John W. "International Comparisons of Recent Productivity Trends." In *Essays in Contemporary Economic Problems. Demand, Productivity, and Population.* William Fellner, ed. Washington, American Enterprise Institute, 1981, pp. 125–170.

Presents estimates or rates of change in real gross product factor inputs, and productivity ratios for the business economies of the United States and eight other members of the Organization for Economic Cooperation and Development, 1960–73 and 1973–79. Uses a Denison-type growth accounting model. Finds that productivity advance decelerated significantly in all nine countries after 1973.

5.26 Kostin, L.A. "Problems of Labour Productivity in Soviet Industry." *International Labour Review,* September-October 1980, pp. 595–608.

Reviews measurement procedures. Presents sectoral and international comparisons. Discusses labor shortages and other factors affecting productivity trends.

5.27 Kravis, Irving B. and others. "New Insights Into the Structure of the World Economy." *The Review of Income and Wealth,* December 1981, pp. 339–356.

The authors present comparative data on per capita gross domestic product for 34 countries. Data are derived from a United Nations study that used purchasing power parties (rather than exchange rates).

5.28 Maddison, Angus. "International Productivity Comparisons: National Differentials." In *Demensions of Productivity Research. Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 607–644.

Presents comparisons of gross domestic product per person-hour for 16 countries. Finds that the United States has been the productivity leader since 1890, that the international productivity gap has narrowed since

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World War II, and that productivity growth has slackened in nearly all countries since 1973.

5.29 Maddison, Angus "Long-Run Dynamics of Productivity Growth." *Banco Nazionale del Lavoro Quarterly Review*, March 1979, pp. 3–44.

Discusses the record of productivity advance since 1870 in several countries, together with the factors that influenced the advance, emphasizing the level and stability of demand, technical progress, capital stock intercountry transmission of pro-growth influences, and structural changes.

5.30 Maddison, Angus, "Per Capita Output in the Long Run." *Kyklos*, 1979, 32, pp. 412–429.

Presents estimates of per capita real output in 16 countries for 1870–1978. Discusses implications for the analysis of economic growth, with particular reference to W.W. Rostow and Simon Kuznets.

5.31 Maddison, Angus. "Western Economic Performance in the Seventies. A Perspective and Assessment." *Banca Nazionale Del Lavoro Quarterly Review*, September 1980, pp. 247–289.

Examining 16 industrialized countries the author searches for the reasons for deteriorating economic performance. Finds these to include the breakdown of the fixed exchange rate system, weakened commitment to Keynesian-type demand management, declines in supply potential, and strong inflationary expectations.

5.32 Mansfield, Edwin, and others. *Indicators of International Technology and Trade Flows*. Vol. 1, papers commissioned as background for *Science Indicators—1980*. Washington, National Science Foundation, 1980.

Contains papers by noted experts, focussing on technology and trade flows in *Science Indicators—1978*, and the adequacy of the data.

5.33 Maxcy, George, *The Multinational Automobile Industry*. New York, St. Martin's Press, 1981, 290 pp.

Traces the history of the industry and presents case studies describing production conditions in mature countries. Discusses reasons for the development of the world car, citing competitive pressures and analyzes the role of developing countries where an import-substituting motor industry acts as a catalyst for economic growth. Sees future growth of the industry to occur in low-wage, developing countries, with output in some countries stabilizing at current levels.

5.34 May, J.D. and Danny, M. "Postwar Productivity in Canadian Manufacturing." *Canadian Journal of Economics*, February 1979, pp. 29–41.

The authors estimate total factor productivity between 1948 and 1976. They compare their findings with simpler measures of productivity. They investigate the sensitivity of the estimates to alternative measures of capital and labor services.

5.35 Neef, Arthur and Capdevielle, Patricia. "International Comparisons of Productivity and Labor Costs." *Monthly Labor Review*, December 1980, pp. 32–39.

The authors analyze the slowdown in manufacturing productivity growth in major industrial countries after 1973. They discuss output, employment, hours, the trend in hourly compensation, and unit labor costs.

5.36 Norsworthy, J. Randolph, "Recent Productivity Trends in the U.S. and Japan." Testimony prepared for the U.S. Senate Subcommittee on Employment and Productivity, Committee on Human Resources, April 2, 1982. Washington, U.S. Government Printing Office. 19 pp.

Compares trends in multifactor productivity for 1965–73 and 1973–78 in the United States and Japan. Explains reasons underlying differences in the rates of individual factor inputs, stressing the impact of high energy prices on capital investment and productivity during the latter period.

5.37 Nukazawa, Kazuo. *Implications of Japan's Emerging Service Industry*. Japan, Keidanren, 1980. 56 pp.

Discusses prospects of expansion of the Japanese service industry, presenting international comparisons. Analyzes relevant employment trends, arguing that the American pattern of service industry expansion will be repeated in Japan.

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5.38 Nyers, Jozsef. "Comparison of the Productivity Levels of Austrian and Hungarian Industry: Methods and Results." *The Review of Income and Wealth*, December 1982, pp. 431–448.

Surveys the history of international comparisons initiated by Hungarian statistical agencies. Discusses the growing productivity advantage of Austrian industry. Analyzes the uses of the comparisons and their limitations.

5.39 Packer, Arnold and Neef, Arthur, "The International Context." *Executive*, Fall 1980, pp. 13–17.

Explaining the concept of per capita gross domestic product, and the authors present international comparisons of per capita GDP of manufacturing productivity. They discuss reasons for underlying differences.

5.40 Prais, S.J. *Productivity and Industrial Structure. A Statistical Study of Manufacturing Industry in Britain, Germany, and the United States.* New York, Cambridge University Press, 1981. 401 pp.

Focuses on the factors affecting productivity change in these countries. Examines particularly the effects of differences in size of manufacturing units, presenting details for ten industries. Stresses improvement of technical caliber of the work force and of the system governing working conditions, especially in Britain.

5.41 Roy, A.D. "Labour Productivity in 1980: An International Comparison." *National Institute Economic Review*, 1982, pp. 26–37.

Estimates the United Kingdom's 1980 average output of all goods and services per worker to be 60 percent of United States'. Also presents comparisons for Japan, Italy, Germany, and other countries.

5.42 Saunders, Ronald. "The Determinants of Productivity in Canadian Manufacturing Industries." *Journal of Industrial Economics*, December 1980, pp. 167–184.

Examines factors determining interindustry variations in productivity. Compares data with U.S. industries. Finds scale economics and product differentiation to be associated with the survival of inefficient smaller firms where tariff protection is effective. Also finds relative productivity to be affected by foreign ownership.

5.43 Schoech, Philip E. *Measuring Economic Performance in The Netherlands, 1951–1976.* Doctoral dissertation submitted to the University of Wisconsin, 1980. 268 pp.

Constructs a series of accounts, including a product account to measure total factor productivity. Compiles two productivity index series from gross output, with capital, labor, and intermediate goods as factors of production. Also compiles a value-added measure of output, with capital and labor as factors of production, as well as a receipts and expenditure account from which to construct an index of the living standard. Compares the productivity measures with this index.

5.44 Sharpe, Donald A. *The Structure of the Canadian Economy, 1961–76: A Marxian Input-Output Analysis.* Doctoral dissertation submitted to McGill University, 1982.

After reviewing "conventional" economic statistics, the author analyzes the Canadian economy using the Marxian concepts of surplus value, variable capital, and constant capital.

5.45 Shelp, Ronald K. *Beyond Industrialization: Ascendancy of the Global Service Industry.* New York, Praeger, 1981. 242 pp.

Examines the importance, present and future, of services in industrial and developing economies. Reviews pertinent economic theories, finding them inadequate for understanding current tendencies.

5.46 Smith, A.D. and others. "International Industrial Productivity: A Comparison of Britain, America and Germany." *National Institute Economic Review*, 1982 (101), pp. 13–25.

The authors explore strengths and weaknesses of British industrial sectors by comparing their productivity with other advanced countries. They find U.S. productivity to have been 2.7 times as great as British and German productivity. They also find performance to have been particularly poor in public utilities, the extractive industries, and in manufacturing.

5.47 Tsao, Yuan. *Growth and Productivity in Singapore: A Supply Side Analysis.* Doctoral dis-

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sertation submitted to Harvard University, 1982. 335 pp.

Discusses sources of growth of 28 manufacturing industries, 1970–79. Finds output growth to have been linked mainly to the growth of such factor inputs as nonenergy intermediate and capital inputs. Also finds only small increases in the rate of technical change, even in such prominent industries as electrical and industrial machinery.

5.48 United Nations Industrial Development Organization. *World Industry since 1960: Progress and Prospects.* New York, United Nations, 1979. 422 pp.

Documents and analyzes basic trends in world industrial output, employment, and technology. Offers projections to the year 2000. Evaluates progress made by developing countries. Discusses related issues.

5.49 Visser, Jan H. "Productivity Research in the Republic of South Africa." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 699–711.

Presents data bearing on South Africa's lag in productivity levels, as well as a summary of production resources. Describes program of the National Productivity Institute as centering upon specific industries. Emphasizes studies of clerical productivity. Discusses future research needs in terms of standard times and data blocks unable across diverse firms within an industry.

5.50 Wagner, Karin. "The Newspaper Industry in Britain, Germany and the United States." *National Institute Economic Review,* February 1981, pp. 81–88.

Compares structure and productivity performance of the newspaper industry in the three countries. Argues that no economies of scale have been attained in Britain despite larger plants and higher concentration. Also examines how new technology has been introduced. Discusses industrial relations as well.

5.51 Wiboonchutikula, Paitoon. *The Total Factor Productivity Growth of the Manufacturing Industries of Thailand.* Doctoral dissertation submitted to the University of Minnesota, 1982. 244 pp.

Estimates and analyzes total factor productivity growth in 3-digit manufacturing industries in Thailand, 1963–76. Examines the agricultural machinery industry in detail. Finds productivity growth to be low despite comparatively high output rates. Also finds increases to have been linked with import substitution and export promotion.

5.52 Wilcynski, J. *The Economics of Socialism: Principles Governing the Operation of the Centrally Planned Economies under the New System.* Boston, Allen & Unwin, 1982. 238 pp.

Among other topics, the author discusses reasons for declining economic growth rates and increasing fluctuations, as well as economic planning and its computerization.

5.53 Yamada, Saburo and Ruttan, Vernon W. "International Comparisons of Productivity in Agriculture." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research Studies in Income and Wealth, Vol. 44. Chicago, The University of Chicago Press, 1980, pp. 509–585.

The authors extend an earlier study testing the induced innovation hypothesis against the historical experience of agricultural productivity growth in Japan and the United States. They add Denmark, France, Germany, and the United Kingdom to their examination. They investigate changes in relative factor prices, technical change, productivity growth, and agricultural development.

Factors affecting productivity charge

Workforce characteristics and education

6.1 Ahlstroem, Goeran. *Engineers and Industrial Growth. Higher Technical Education and the Engineering Profession during the 19th and Early 20th Centuries—France, Germany, Sweden, and England.* Totowa, N.J., Biblio Distribution Center, 1982. 118 pp.

Presents data on the supply of qualified engineers. Explores engineers' significance to the industrial growth of the countries examined. Discusses occupational choice of engineering students. Maintains that engineers were held in low esteem in England owing to

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certain cultural factors, but in high esteem in the other countries.

6.2 Anderson, William S. "Meeting the Japanese Economic Challenge." Joint Economic Committee, U.S. Congress. *The Economy of 1981. A Bipartisan Look.* Proceedings of a Congressional economic conference, December 10, 1980. Washington, U.S. Government Printing Office, April 20, 1981, pp. 149–166.

Examines factors underlying Japan's trading and economic performance, including a zeal for learning and for productivity improvement. Argues the decline of industrial innovation in the United States, placing blame in part on management.

6.3 Arlinghaus, Bruce E. "'Dumb' Soldiers and 'Smart' Bombs: Precision-Guided Munitions and the All-Volunteer Force." In *Defense Manpower Planning. Issues for the 1980s.* William J. Taylor and others, eds. New York, Pergamon Press, 1981, pp. 80–87.

Discusses policies that tend to substitute technology for soldiers' expertise in handling munitions and reasons for these policies. Stresses the dependence of munitions upon proper operation and maintenance and the need for intensive training.

6.4 Baum, George, *The Priority of Labor. A Commentary on Laborem exercens.* Encyclical Letter of Pope John Paul II. New York, Paulist Press, 1982. 152 pp.

Discusses and interprets the themes that occur in the papal encyclical on labor. Deals with man as laborer and as subject of labor, the priority of labor over capital, technology as an ally of labor, and the socialism of John Paul II, and other topics.

6.5 Bertrand, O. and others. "The Planning of Training in the Third World." *International Labour Review*, Sept.-Oct. 1981, pp. 531–544.

The authors argue that planning for training is necessary no matter what the economic uncertainties. They discuss forecasts and their limitations as well as planning methods.

6.6 Bezilla, Michael. *Engineering Education at Penn State: A Century in the Land Grant Tradition.* University Park, Pennsylvania State University Press, 1981. 239 pp.

Traces the evolution of engineering education in a college that had been primarily intended to train farmers.

6.7 Blake, Robert R. and Mouton, Jane S. *Productivity: The Human Side.* New York, Amacom, 1981. 133 pp.

The authors suggest that the management of attitudes toward productivity can create a favorable orientation on workers' part. They base their argument on the tendency of small groups to converge around norms, enforced through group pressures upon the individual. They discuss the origin of norms and group pressures, intergroup relations, and related topics.

6.8 Blanpied, William A. "Recent Trends in the Education of Scientists and Engineers." In National Science Foundation. *Annual Science and Technology Report to the Congress*, 1980. Washington, U.S. Government Printing Office, 1981, pp. 88–95.

Defines four problems: the inadequate number of graduates in the computer professions and most engineering specialties; the likely persistence of shortages in these areas; the shortages of qualified facility in university computer and engineering departments; and, obsolete university research facilities.

6.9 Bluestone, Irving. "How Quality-of-Worklife Projects Work for the United Auto Workers." *Monthly Labor Review*, July 1980, pp. 39–41.

Discusses structure and progress of such projects at General Motors. Notes safeguards against increasing production standards, loss of jobs, and compulsion to participate. Stresses the need to change the autocratic climate in plants.

6.10 Bowman, Mary Jean. *Educational Choice and Labor Markets in Japan.* Chicago, University of Chicago Press, 1981. 367 pp.

Explores pupils' plans and expectations regarding their future education and career options, and the conditioning of these plans by family background. Also examines life earnings, comparing experience with expectations.

6.11 Bowman, Mary Jean and others. *Learning and Earning. Three Essays in the Economics*

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of Education. Stockholm, National Board of Universities and Colleges, 1978. 272 pp.

The authors discuss such subjects as the long-run relation between higher education and production, issues in the philosophy of educational planning, and the relation of educational developments to the labor market in Sweden.

6.12 Brach, Peter R. *Engineering Employment by Manufacturing Firms.* Doctoral dissertation presented to the University of Pennsylvania, 1980. 321 pp.

Explains engineering employment by firms on the basis of the interrelation of sales, R & D expenditures, and engineer entry level salaries. Examines degree-level distribution among firms and salary structures, explaining these variables in terms of firm size, ratio to total firm employment, and of scientists to engineers.

6.13 Bregger, John E. "Labor Force Data from the CPS to Undergo Revision in January 1983." *Monthly Labor Review*, November 1982, pp. 3–6.

Details various changes to the Current Population Survey, among them the dropping of white-collar and blue-collar occupational classifications, and redefinitions of major occupational groups.

6.14 Burns, Tom R. and others. *Work and Power. The Liberation of Work and the Control of Political Power.* Beverly Hills, Sage, 1979. 391 pp.

A collection of essays concerned with effects of worker participation in plant management, its historical sources, and relations to political power. Includes discussions of the effects of worker participation schemes on productivity and technological change.

6.15 Carlson, Leonard A. "Labor Supply, the Acquisition of Skills, and the Location of Southern Textile Mills, 1880–1900." *The Journal of Economic History*, March 1981, pp. 65–73.

Argues that location of textile mills was determined by residence of skilled workforce in the Piedmont.

6.16 Carter, Michael Joseph. *The Determinants of Relative Wage Structures.* Doctoral dissertation submitted to Stanford University 1981. 258 pp.

Proposing an alternative to the human capital theory explanation of wage differences, the author argues that relatively high wages are maintained in a labor market by excluding groups with a history of low wages. He argues further that among factors determining access of a group to a labor market are cost and type of learning needed for proficient performance of a task, interdependence of workers' productivity, degrees of prejudice toward "outsiders", and business policies in constraining wage expectations and avoiding disruption of work.

6.17 Casey, Florence M. *Work Attitudes and Work Experience.* R&D Monograph 60. Department of Labor, Employment and Training Administration, 1979. Washington, U.S. Government Printing Office. 35 pp.

Discusses levels and trends in jobs satisfaction, the effect of worker attitudes on their choice of employment, and differences among workers in experiencing job satisfaction. Finds occupational prestige and promotions to be consistently associated with job satisfaction and positive changes therein.

6.18 Chelte, Anthony F. and others. "Did Job Satisfaction Really Drop During the 1970s?" *Monthly Labor Review*, November 1982, pp. 33–36.

The authors argue that a drop in job satisfaction shown by Quality of Employment surveys conducted during the 1970's is implausible in light of other surveys showing satisfaction among a constant proportion of the surveyed workforce.

6.19 Chinlowy, P.T. "Sources of Quality Change in Labor Input." *American Economic Review*, March 1980, pp. 108–119.

Offers a measure of labor input for use in production function estimation and examination of productivity change. Incorporates quality variables.

6.20 Chintakananda, Klin-Keo P. *The Role of Investment in Education in Thailand's Economic and Social Development (1961–76).* Doctoral dissertation presented to Indiana University, 1980. 234 pp.

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Compiles age- and sex-adjusted earnings profiles, and argues that a positive relation exists in Thailand between education and earnings. Finds that the social rates of return were higher primary and lower secondary education than for higher secondary education. Holds that educational resources should be adjusted accordingly.

6.21 Claycombe, Richard J. *The Supply of Young Craftsmen to an Industry.* Doctoral dissertation presented to George Washington University, 1980. 175 pp.

Examines the career development patterns of young craft workers, providing data bearing upon their human capital investment and earnings. Stresses earnings effects on turnover. Finds that individuals with immediate income needs to be less likely to enter crafts than others under less pressure to earn.

6.22 Cohen, Malcolm S. and Schwartz, Arthur R. "U.S. Labor Turnover: Analysis of a New Measure." *Monthly Labor Review,* November 1980, pp. 9–13.

The authors describe how pertinent data are obtained. They present turnover rates by industry and region, with breakdowns for new hires and separation rates by sectors of the economy and selected industries. They also assess underlying statistical procedures.

6.23 Cole, Robert E. *Work, Mobility, and Participation. A Comparative Study of American and Japanese Industry.* Berkeley, University of California Press, 1979. 293 pp.

Discusses and evaluates work design and redesign in Japan, including the use of quality circles, and the institutional bases of Japanese, compared with American labor relations. Also discusses comparative mobility patterns and the Japanese work ethic.

6.24 Cooley, Mike. "Computerization—Taylor's Latest Disguise." *Economic and Industrial Democracy,* November 1980, pp. 523–540.

Evaluates the extension of job analysis by computer to intellectual tasks. Discusses possible alternatives to the downgrading of jobs by computers.

6.25 Cullen, John B. *The Structure of Professionalism. A Quantitative Examination.* New York, PBI Petrocelli Books, 1978. 290 pp.

Explores the occupational conditions pertaining to the concept of professionalism. Examines 267 occupations. Finds task complexity and intellectual sophistication to be major determinants of professionalism.

6.26 Darity, William A. Jr. "The Human Capital Approach to Black-White Earnings Inequality: Some Unsettled Questions." *Journal of Human Resources,* Winter 1982, pp. 72–93.

Advances a critique of the human capital approach in explaining black-white earnings differentials. Identifies weaknesses in this approach, shedding doubt on its explanation of social inequality. Believes alternative approaches must be formulated.

6.27 Dawson, Andrew. "The Paradox of Dynamic Technological Change and the Labor Aristocracy in the United States, 1880–1914." *Labor History,* Summer 1979, pp. 325–351.

Discusses reasons for the resilience of skilled crafts during an era of rapid mechanization and growth in the employment of unskilled or semiskilled workers. Analyzes income differentials. Shows that crafts that were destroyed were marginal to the community of the labor aristocracy.

6.28 Denzin, Christine E. *Wage Rate and Educational Level as Determinants of Household Time Inputs to Personal Work.* Doctoral dissertation presented to Purdue University, 1978. 186 pp.

Investigates the allocation of time by households to the care of members and goods. Isolates households' price of time, as represented by the hourly wage rates of husbands and wives, and households' productivity, as represented by completed schooling. Finds husbands' schooling to be inversely related to household time inputs to nonmarket activities, and wives' employment likewise to decrease time spent on nonmarket activities and care of family.

6.29 Dumas, Neil S. *The Stock of Science and Engineering Master's Degreeholders in the United States.* Special Report. Washington, National Science Foundation, December 1980. 90 pp.

Provides estimates of the number of science and engineering Master's degreeholders in the

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United States. Analyzes the contribution of demographic and nondemographic factors to the growth in the number of degrees.

6.30 Ebel, Karl H. "The Microelectronics Training Gap in the Metal Trades." *International Labour Review*, November-December 1981, pp. 727–740.

Examines response to training needs in various national training systems and enterprises. Holds that broad basic and systematic training and continuous updating are essential.

6.31 Edwards, Richard. *Contested Terrain. The Transformation of the Workplace in the Twentieth Century*. New York, Basic Books, 1979. 261 pp.

Explores the forces underlying change in the workplace and their effects on workers. Traces the changing workplace organization from the personal authoritarian rule of the foreman to the impersonal authoritarian rule of the organization. Links workplace transformation with larger forces in the environment of capitalism.

6.32 Emerson, John Philip. "The Labor Force of China, 1957–80." Joint Economic Committee, U.S. Congress. *China under the Four Modernizations*. Part 1. Washington, U.S. Government Printing Office, August 13, 1982, pp. 224–267.

In addition to discussing the demand and supply of labor rural and urban areas, the author discusses educational policy and its relation to the urban labor force.

6.33 Etzioni, Amitai. "Productivity: The Human Factor." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research*, The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 27–38

Discusses a number of noneconomic factors underlying productivity growth including schooling, family background, and job structuring.

6.34 Field, A.J. "Industrialization and Skill Intensity: The Case of Massachusetts." *Journal of Human Resources*, Spring 1980, pp. 149–175.

Examines the evolution of the Massachusetts economy, 1920–80. Finds no increase in the overall demand for skilled or educated labor, at least prior to 1970.

6.35 Filer, Randall K. *The Influence of Affective Human Capital on the Wage Equation*. Doctoral dissertation presented to Princeton University, 1979. 159 pp.

Investigates the extent to which individuals' human capital consists of their "affective skills", defined as personality traits. Estimates wage equations on the basis of a psychological measure of personality. Shows that the wage equation's predictive ability is improved when personality traints are added to a sample stratified by sex, educational level, occupation, and industry.

6.36 Fisher, Jean E. *Evolution of a Hospital Labor System. Technology, Coercion and Conflict*. Doctoral dissertation submitted to the University of Massachusetts, 1982. 346 pp.

An investigation of changes in the hospital labor system including adding to the number and variety of intermediate outputs, increasing mechanization, specializing of skills and authority, and imposition of bureaucratic structures. Argues that factors underlying these changes include management's desire to increase the pace of work and its authority over workers, as well as technical and market constraints.

6.37 Fraser, Douglas A. "Employee Participation for Productivity: A Labor View." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth*. New York, Van Nostrand Reinhold, 1981, pp. 310–329.

After discussing the shortfall in fixed nonresidential investment, the author describes shop floor conditions affecting productivity and managerial control over them as well as labor's attitude toward technological innovation. Also discusses limitations of current productivity measures.

6.38 Fredland, J.E. and Little, R.D. "Long-Term Returns to Vocational Training: Evidence from Military Sources." *Journal of Human Resources*, Winter 1980, pp. 49–66.

The authors investigate data on mid-career white male workers who had received military vocational training during World War II and immediately after, finding those to have

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used their training to have received long-term premiums.

6.39 Fuller, Stephen H. "Employee Participation for Productivity: A Management View." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth*. New York, Van Nostrand, Reinhold, 1981, pp. 296–309.

Describes the quality of worklife program and its objectives at General Motors. Discusses certain conflicting value systems and obstacles to the program.

6.40 Fuller, Stephen H. "How Quality-of-Worklife Projects Work for General Motors." *Monthly Labor Review*, July 1980, pp. 37–39.

Lists purposes and characteristics of quality-of-work life programs. Notes union-management collaboration and its structure. Discusses rearrangement of plant management as one of a number of approaches to improvement of work life quality. Emphasizes employee-management communication.

6.41 Gay, R.S. and Borus, M.E. "Validating Performance Indicators for Employment and Training Programs." *Journal of Economic Resources*, Winter 1980, pp. 29–48.

The authors correlate eight performance indicators with their effect on earnings of participation in four types of programs, finding that these indicators give no useful information of program effectiveness. They propose substitute indicators.

6.42 Ginzberg, Eli. "The Changing Workforce and Role of Work in an Era of Constrained Growth." *The Adherent*, March 1981, pp. 25–38.

Discusses factors affecting the supply of labor in the 1980's emphasizing educational characteristics. Analyzes demand factors, including skill level. Also discusses flexitime arrangements and the need for continuing worker education and training.

6.43 Gustman, Alan L. and Steinmeier, Thomas L. "The Relation Between Vocational Training and Economic Outcomes." *Industrial Labor Relations Review*, October 1982, pp. 73–87.

Analyzing the labor market effects of vocational training, the authors find positive returns of such training especially for white women enrolled in business programs. Also finds that trade and industry courses raise white men's earnings in subsequent years. For minorities, no clear findings are offered.

6.44 Hannah, Richard L. *A Case Study of Underground Coal Mining Productivity in Utah*. Doctoral dissertation submitted to the University of Utah, 1981. 288 pp.

Examines reasons why productivity among coal miners in Utah varies widely. Finds that the industrial relations environment largely explains the variety. Argues that, beyond labor-management relations, such factors as the organization of internal labor markets, the impact of unions on management philosophy, and miners' work ethic are relevant.

6.45 Harasztu, Miklos. *A Worker in a Worker's State*. New York, Universe Books, 1978. 175 pp.

Describes the industrial environment of workers in a Hungarian tractor factory. Details techniques and forms of incentive payments, describing their effect on worker attitudes and incomes, the quality of output, and relations with foremen.

6.46 Hartog, Joop. "Earnings and Capability Requirements." *The Review of Economics and Statistics*, May 1980, pp. 230–240.

Relating earnings to different variables, the author finds intellectual capabilities fetching the highest rewards, followed by social and manual capabilities.

6.47 Helvoort van, Earnest. *The Japanese Working Man. What Choice? What Reward?* Vancouver, University of British Columbia Press, 1979. 158 pp.

Discusses the conduct of personnel management, motivation, training and education, incentive systems, participation in decisions, quality control practices and other pertinent subjects.

6.48 Hill, Russell C. "Capacities, Opportunities and Educational Investments. The Case of the High School Dropout." *The Review of Economics and Statistics*, February 1979, pp. 9–20.

Analyses the labor market achievements of high school dropouts in terms of comparisons of their 1969 and 1970 earnings with high

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school graduates. Finds initial disadvantages but mitigation of these as dropputs age, and that dropping out has only modest effects on earnings compared with employed high school graduates.

6.49 Hirschhorn, Larry. "The Soul of a New Worker." *Working Papers*, January–February 1982, pp. 42–47.

Argues the need for workers capable to solve problems. Believes that the near-catastophe of Three Mile Island was in part related to inadequate problem-solving ability of workers, linked, to excessive technological feedback monitoring.

6.50 Howard, Robert. "Second Class in Silicon Valley." *Working Papers*, September/October 1981, pp. 20–31.

Discusses the work and working conditions of production workers and engineers in semiconductor manufacturing. Also summarizes prevalent technologies.

6.51 Huffman, Wallace E. "Black-White Human Capital Differences: Impact on Agricultural Productivity in the U.S. South." *American Economic Review*, March 1981, pp. 94–107.

Estimates econometrically the differences in productivity between white and black operator farms. Finds that quantity and quality of education and of agricultural extension are the primary sources of differences.

6.52 Huffman, Wallace E. "Farm and Off-Farm Work Decisions: The Role of Human Capital." *The Review of Economics and Statistics*, February 1980, pp. 14–23.

Presents econometric evidence on the effect of investment in education and information on the off-farm labor supply of farmers. Finds that farmers with more education tend to reallocate their labor services faster to nonfarm work than farmers with lower educational attainment.

6.53 Hunter, Holland, ed. *The Future of the Soviet Economy: 1978–1985*. Boulder, Colo., Westview Press, 1978. 177 pp.

A collection of papers, dealing with, among other topics, labor force trends, output, and the stock of human capital in Soviet Russia.

6.54 Immink, Maarten D.C. *Human Energy Supplementation and Worker Productivity. A Case Study of Sugarcane Workers in Guatemala.* Doctoral dissertation presented to the University of Hawaii, 1978. 326 pp.

Hypothesizes that a significant increase in daily energy expenditure will result in increased daily putput per worker or increased work intensity per unit of time or both. Finds however, that while present levels of energy intake limit output per worker, increased daily energy expenditures do not necessarily spell increased worker productivity.

6.55 Jacob, Betty M. and Jacob, Philip E. *Humanized Productivity under Advanced Industrial Technology*. Honolulu, Research Corporation of the University of Hawaii, December 1979. 113 pp.

The authors present comparative studies of several socialist and nonsocialist countries on automation and worklife quality of workers in the automobile industry. In particular, they examine work content, working conditions, and worker attitudes. They find satisfaction to be related to work content, rather than the degree of automation of the work process.

6.56 Jantzen, Robert H. *The Impact of CETA Training on Earnings, Hours, Employment and Wages*. Doctoral dissertation submitted to Northeastern University, 1982. 205 pp.

The author finds that training significantly raised the weekly earnings of CETA participants, although spells of employment of men were not significantly increased, while gains in women's employment arose chiefly from gains in hours worked.

6.57 Johnson, Merrill L. *Industrial Evolution in Selected Labor Intensive Environments of the Southern Piedmont, 1947–77*. Doctoral dissertation submitted to the University of Georgia, 1981. 223 pp.

Argues that the spread of labor-intensive industries such as apparel and textiles in the study area created an experienced industrial workforce, making the area more attractive to other industries, including more capital-intensive ones. Shows that the older labor-intensive areas of the Piedmont became capital-intensive during the 1950–70 period.

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6.58 Joint Economic Committee, U.S. Congress. *Human Resources and Demographics: Characteristics of People and Policy. Special Study on Economic Change.* Vol. 1. Washington, U.S. Government Printing Office, December 12, 1980. 281 pp.

Presents studies by various authors on the service industries, the work ethic, the relation of employment to labor force growth, trends in hours of work, and social and political factors affecting economic growth. (Essays from this volume are individually listed and annotated.)

6.59 Jones, E.B. and Long, J.E. "Part-Week Work and Human Capital Investment by Married Women." *Journal of Human Resources,* Fall 1979, pp. 563–578.

The authors hypothesize, and their findings confirm, that employers will have relatively lower incentive to invest in on-the-job training of women working only part of the week than if they were to work full-time.

6.60 Jones, Robert J. *A Capital Accumulation Analysis of Intercountry Differences in Education and Economic Growth.* Doctoral dissertation presented to Columbia University, 1978. 127 pp.

Estimates functions for short-run and long-run effects of education on economic growth and development. Finds high rates of return to persons having a secondary education but greater returns to those having a higher education, especially in the long run. In agricultural societies, secondary education both short- and long-run gains.

6.61 Joskow, P.L. and Rozanski, G.A. "The Effects of Learning by Doing on Nuclear Plant Operating Reliability." *Review of Economics and Statistics,* May 1979, pp. 161–168.

The authors relate annual capacity factors of nuclear power plants to the amount of experience designers and builder have had with given plants. They formulate hypotheses concerning the constancy of the learning process across plants of different types and vintages.

6.62 Kagel, John H. and others. "Marihuana and Work Performance: Results from an Experiment." *Journal of Human Resources,* Summer 1980, pp. 373–395.

The authors examine the effects of marihuana availability and consumption upon hours worked and output per hour. They find no effect on total hours worked or total output as between experimental and control groups.

6.63 Kerr, Clark and Rosow, Jerome M., eds. *Work in America. The Decade Ahead.* New York. Van Nostrand Reinhold, Work in America Institute Series, 1979. 288 pp.

A series of essays on expected changes in the composition of the work force, work values, quality-of-work-life issues, the impact of changing technology, productivity trends, and related subjects.

6.64 Kidd, Charles V. *Manpower Policies for the Use of Science and Technology in Development.* New York, Pergamon Press, 1980. 183 pp.

Surveys aspects of education and training bearing on the title subject. Discusses demand and supply of science and technology workers and examines the implications of development doctrines for national educational policies.

6.65 Killingsworth, Mark R. "'Learning by Doing' and 'Invest in Training': A Synthesis of Two 'Rival' Models of the Life Cycle." *Review of Economic Studies,* April 1982, pp. 263–271.

Discusses overlap and differences between the two models. Develops a model of his own in which human capital development incorporates both of the models in the title. Analyzes effects on the depreciation of human capital.

6.66 Kunze, Kent. "Evaluation of Work-Force Composition Adjustment." In National Research Council. *Measurement and Interpretation of Productivity.* Washington, National Academy of Sciences, 1979, pp. 334–362.

Defines worker characteristics contributing to productivity change. Evaluates different methods of measuring and aggregating such characteristics. Considers practicable procedures by which the BLS could implement the measurement of the productivity effects of work-force composition.

6.67 Lampert, Nicholas. *The Technical Intelligentsia and the Soviet State.* New York, Holmes & Meier, 1979. 191 pp.

Describes the transition from the old-generation specialists to a new generation that re-

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ceived indoctrination under Stalin's tutelage. Also discusses the decline of trade unions and the growing links between industrial management and the Communist party.

6.68 Leffler, K.B. and Lindsay, C.M. "How Do Human Capital Investors Form Earnings Expectations?" *Southern Economic Journal, State.* October 1979, pp. 591–602.

After discussing the usual approaches to the problem suggested by the title, the authors construct alternative estimates of the yields from medical training embodying various degrees of investor sophistication and compare their results with actual investor expectations.

6.69 Levine, Solomon B. and Kawada, Hisashi. *Human Resources in Japanese Industrial Development.* Princeton, Princeton University Press, 1980. 332 pp.

The authors focus on educational and training institutions that evolved since Japan began its transformation from an agricultural to an industrial society, arguing that these institutions represented a major factor in Japan's economic growth. They discuss, in particular, training in large industries, such as steel, telecommunications, banking, and capital goods industries.

6.70 Levitan, Sar and Johnson, Clifford M. *Second Thoughts on Work.* Kalamazoo, Mich., Upjohn Institute for Employment Research, 1982. 241 pp.

The authors discuss the meaning of work, the growing labor force, work dissatisfaction, the changing nature of work, and other pertinent topics. They find a steady expansion in the degree of personal choice and control at work, although these are usually denied minority workers.

6.71 Lichtenberg, Franklin R. *Training, Tenure, and Productivity.* Doctoral dissertation submitted to the University of Pennsylvania, 1982. 211 pp.

Explores the relation between job tenure and marginal productivity in U.S. manufacturing between the early 1960's and the mid-1970's.

6.72 Ludlum Hashimoto, Margaret D. *The Effect of Industrial Composition on Changes on the Relative Demand for Skilled Labor.* Doctoral dissertation presented to Columbia University, 1979. 173 pp.

Discusses reasons why the composition of industry shifted, raising the demand for skilled labor. Develops a measure to determine relative importance of factors underlying skilled labor demand. Finds that changes in consumption patterns generated most of the demand for skilled labor.

6.73 McClelland, Patrick C. *The Effects of Technological Change on Working Knowledge in Rail Switching.* Doctoral dissertation submitted to The American University, 1981. 347 pp.

Argues that there is a declining need for working knowledge of rail switching owing to technological change, but also holds that required knowledge remains greater than defined by job descriptions. Finds a decline in the number of tasks of subgroups of switching employees.

6.74 McDowell, John M. *Academic Productivity Profiles, Career Choice: Academic Women.* Doctoral dissertation presented to the University of California, Los Angeles, 1979. 166 pp.

Analyses adjustments to the decline in academic learning. Develops criteria to determine what corrective measures are necessary when professors' job-related knowledge declines.

6.75 McGinn, Noel F. and others. *Education and Development in Korea. Studies in the Modernization of Korea, 1945–75.* Cambridge, Mass., Harvard University Press, 1980. 285 pp.

The authors discuss, among other topics, the interaction between changes in Korean education and changes in Korea's economy. They deal with human capital theory and analyze the effect of education on attitudes conducive to economic development.

6.76 Macarov, David. *Worker Productivity. Myths and Reality.* Beverly Hills, Sage, 1982. 223 pp.

Reviews the continuing search efforts for higher productivity. Describes the scientific management and human relations schools of productivity. Explores work patterns in an Is-

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raeli kibbutz. Also discusses work satisfaction and work patterns as sources of productivity.

6.77 Maccoby, Michael and Terzi, Katherine A. "What Happened to the Work Ethic?" In *Human Resources and Demographics: Characteristics of People and Policy. Special Study in Economic Change*, Vol. 1. Joint Economic Committee, U.S. Congress. Washington, U.S. Government Printing Office, Dec. 12, 1980, pp. 71–100.

After defining the various "ethics" subsumed under the term "work ethic," the authors discuss work motivation, as well as demographic differences in job satisfaction.

6.78 Macy, Barry A. "The Quality-of-Worklife Project at Bolivar: An Assessment." *Monthly Labor Review*, July 1980, pp. 41–43.

Describes the measurement of changes, mostly improvements, in job security, health and working conditions, financial security, and productivity (as related to organizational performance) at a firm in Tennessee. Assesses costs and benefits. Notes rise in productivity and product quality.

6.79 Mandi, Peter. *Education and Economic Growth in the Developing Countries*. Budapest, Acdemiai Kiado, 1981. 224 pp.

Argues that there is a reciprocal relation between education and economic growth, and, in developing countries the superiority of a macroeconomic to a human capital approach. Discusses educational planning methods used in socialist countries, as well as manpower planning. Finds relatively low literacy levels to be sufficient for economic development to get underway.

6.80 Martin, Jay D. *The Innovative Personality and the Process of Socioeconomic Change*. Doctoral dissertation submitted to Southern Illinois University at Carbondale, 1980. 316 pp.

Argues that in both traditional and industrial societies there is a need for innovative, self-activated individuals. Holds that the entrepreneurial model of the innovative individual alone is too narrow and ethnocentric. Favors an educational system that stresses learning through social experience, problem-solving, self-directed learning, process orientation, and other features promoting self-actualization.

6.81 Meyer, John W. and Hannan, Michael T., eds. *National Development and the World System. Educational, Economic and Political Change, 1950–70*. Chicago, University of Chicago Press, 1979. 334 pp.

Essays discussing the interaction of education and economic development, among other topics.

6.82 Miller, Ann R. and others, eds. *Work, Jobs, and Occupations. A Critical Analysis of the Dictionary of Occupational Titles*. Washington, National Academy Press, 1980. 431 pp.

A report by the Committee on Occupational Classification and Analysis of the National Research Council, reviewing content and structure of the DOT, its uses, the occupational analysis program, the classification of occupations, and other relevant topics.

6.83 Mine, Manabu. "Quality of Working Life in Japan: Trends and Characteristics." *Labour and Society*, July–September 1982, pp. 25–280.

Discusses growing alienation among Japanese workers with rising educational levels and attempts by management to cope with it by means of quality of work-life programs. Notes government and management concern with the effects of monotonous work on productivity. Argues that efficiency holds priority over humanization; describes the role of industrial engineering departments, especially in substituting machines and technology for human labor.

6.84 More, Charles. *Skill and the English Working Class, 1870–1914*. New York, St. Martin's Press, 1980. 252 pp.

Examines how skills of English working class were acquired and how skill patterns differed between industries. Also explores the extent to which skills were diluted by evolving industry, arguing, however, the continuing necessity for the skilled craft worker throughout the period.

6.85 Nakamura, J.I. "Human Capital Accumulation in Premodern Rural Japan." *The Journal of Economic History*, June 1981, pp. 263–281.

Explores the economic growth of Japan in the past century in terms of the formation of human capital. Views each formation in the context of institutional development, such as

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the democratization of rural local government. Also discusses population control and the evolution of a national market during the Tokugawa period.

6.86 "The New Industrial Relations." *Business Week*, May 11, 1981, pp. 84–98.

Discusses the effect of the changing age structure and educational attainment upon workplace environment. Argues the need for more participatory management to attain higher productivity and quality of output and the "obsolescence" of union-management relations.

6.87 Opel, John R. "Education, Science, and National Economic Competitiveness." *Science*, September 17, 1982, pp. 1116–1117.

Argues that there is a need for an expansion of educational opportunities for scientists and engineers. Compact Japanese and American per-capita outlays on engineering education. Calls for larger Federal expenditures and for encouraging women to enter the engineering and science professions.

6.88 Padilla, Arthur. *Race and Economics. A Human Capital Inquiry.* Doctoral dissertation presented to the University of North Carolina, Chapel Hill, 1978. 105 pp.

Shows that the business cycle significantly and adversely affects the incomes and rates of return to school of young blacks. Demonstrates that employment and wage effects from macroeconomic fluctuations alter rates of return to school.

6.89 Peitchinis, Stephen G. *The Effect of Technological Changes on Educational and Skill Requirements in Industry.* Calgary, Alberta, The University of Calgary, April 1978. 271 pp.

Shows that technological change requires little adjustment in educational or skill levels. Discusses such related themes as the effect of technological change on the sectoral distribution of employment, employment implications, and high-level personnel needs.

6.90 Petzel, T.E. "The Role of Education in the Dynamics of Supply." *American Journal of Agricultural Economics*, August 1978, pp. 445–451.

Focuses on the role of education in entrepreneurial decision-making, developing a model of soybean supply in U.S. counties.

6.91 Polachek, Solomon W. "Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure." *Review of Economics and Statistics*, February 1981, pp. 60–69.

Introduces the concept of heterogeneous human capital so as to determine the optimal kinds as well as amounts of human capital. Infers occupational structures and analyzes reasons underlying occupational segregation by sex. Finds large increases in the number of women professionals would occur if women were to have full lifetime attachment to the labor force.

6.92 Psacharopoulos, G. and Layard, R. "Human Capital and Earnings: British Evidence and a Critique." *Review of Economic Studies*, July 1979, pp. 485–503.

The authors investigate rates of return to school and to on-the-job training, as well as earnings differentials. They find returns from training to be higher than from schooling.

6.93 Puth, Robert C. *American Economic History.* Chicago, Holt, Rinehart, 1982. 485 pp.

Analyzes the growth and operation of the American economy. Inquires into the sources of its success, stressing the more efficient use of human capital.

6.94 Quinn, Robert and Staines, Graham L. *The 1977 Quality of Employment Survey.* Ann Arbor, The University of Michigan Survey Research Center, 1979. 359 pp.

The authors assess the frequency and severity of certain work-related problems; indicate the major demographic groups affected by these problems; recommend measures to enhance job satisfaction; and attempt to develop baseline statistics as pilot studies for possible nationwide surveys of the trends investigated.

6.95 Rizzuto, R. and Wachtel, P. "Further Evidence on the Returns to School Quality." *Journal of Human Resources*, Spring 1980, pp. 240–254.

The authors find a smaller effect of per-pupil educational expenditures on earnings than previously believed. They also find that

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the returns to the investment in life-time quality education includes improved earnings of blacks, while the effect on white males' earnings has remained unchanged.

6.96 Rook, James R. *Labor Skill Composition, Elasticities of Substitution, and Industrial Migration: The Case of Cotton Textiles.* Doctoral dissertation presented to North Carolina State University at Raleigh, 1979. 178 pp.

Investigates why southern entrepreneurs came to dominate the industry by focusing on regional input price differentials. Examines relationships between capital and labor at various skill levels.

6.97 Rosenberg, R.D. and Rosenstein, E. "Participation and Productivity: An Empirical Study." *Industrial Labor Relation Review,* April 1980, pp. 355-367.

The authors construct an index of participative activity of workers in a unionized foundry, measuring such factors as frequency of meetings, relevance of subjects discussed, and number of interchanges at meetings. They compare this index with an index of productivity, concluding that the rise they found in the latter was closely associated with the former.

6.98 Rosow, Jerome M. "Productivity and People." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth.* New York, Van Nostrand Reinhold, 1981, pp. 243-275.

Discusses reasons for the productivity slowdown of the 1970's and analyzes the workforce of the 1980's. Lists targets of opportunity for improving productivity such as reduction of absenteeism and tardiness, reduction of waste and pilferage, improvement of quality control, and management of time.

6.99 Rumberger, Russell W. "The Changing Skill Requirements in the U.S. Economy." *Industrial and Labor Relations Review,* July 1981, pp. 578-590.

Examines factors underlying changing skill requirements, 1960-76. Finds that skill requirements have tended to narrow across as well as within major occupational categories.

6.100 Rumberger, Russell W. *Overeducation in the U.S. Labor Market.* New York, Praeger 1981. 148 pp.

Identifying overeducation as the difference between educational attainment of workers and the educational requirements of their jobs, the author compares relevant labor market data for 1960 and 1976. Finds overeducation, and discusses its implication in terms of job dissatisfaction, impaired worker performance, and other factors.

6.101 Sanders, William V. *Maoist Labor Incentives.* Doctoral dissertation submitted to Pennsylvania State University, 1981. 195 pp.

Describes the impact of Maoist labor incentives on Chinese social goals, particularly labor productivity. Finds that the incentive system included viable elements, but that excesses in its application prevented accomplishment of objectives.

6.102 Schultz, Theodore W. *Investing in People. The Economics of Population Quality.* Berkeley, University of California Press, 1981. 173 pp.

Argues that increased ability and advances in knowledge are crucial to future productivity. Examines certain distortions interfering with this orientation in schooling and research.

6.103 Schultz, Theodore W. "Investment in Entrepreneurial Ability." *Scandinavian Journal of Economics,* 1980, pp. 437-448.

Holds that persons from a wide variety of occupational backgrounds turn entrepreneurs sometime during their lifetimes. Argues that the entrepreneurial ability acquired by education is measurable, and also that economic value of entrepreneurship cannot be equated to a return to risk taking.

6.104 Scott, Richard D. *Schooling, Experience, Hours of Work, and Earnings in Canada.* Doctoral dissertation presented to The University of British Columbia, 1979. No indication of pp.

Using a human capital model developed by Jacob Mincer, the author investigates factors influencing earnings of Canadian men. Offers a critique of human capital theory, arguing its nonscientific nature because it does not generate falsifiable hypotheses.

6.105 Siracusa, Carl. *A Mechanical People: Perceptions of the Industrial Order in Massachu-*

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setts, 1815-1880. Middletown, Conn., Wesleyan University Press, 1979. 313 pp.

Surveys and analyzes the opinion of political leaders about the reshaping of Massachusetts' economy from agrarian to industrial. Discusses the human meaning of the new industrial technology in 19th century America.

6.106 Sirageldin, Ismail, ed. *Research in Human Capital and Development. A Research Annual.* Vol. 1. Greenwich, Conn., JAI Press, 1979. 258 pp.

Essays focusing on the relation between human capital and social change. Subjects studied include manpower and educational planning problems, the growth of professional occupations in the United States manufacturing sector, and the effect of a college education on hourly earnings.

6.107 Staines, Graham L. and Quinn, Robert P. "American Workers Evaluate the Quality of Their Jobs." *Monthly Labor Review*, January 1979, pp. 1-12.

The authors discuss findings from a 1977 survey, showing a decline in job satisfaction and the desire to stay at the present job. They detail the fequency of work-related problems, including work schedules, work content, and job security.

6.108 Sullivan, Teresa. *Marginal Workers, Marginal Jobs. The Underutilization of American Workers.* Austin, University of Texas Press, 1978. 229 pp.

Explores the concept of underutilization, defining adequate employment in terms of weekly hours worked, income, and skills. Tests pertinent hypotheses, drawing on Census data.

6.109 Tan, Hong Wee. *Human Capital and Technical Change. A Study of Wage Differentials in Japanese Manufacturing.* Doctoral dissertation submitted to Yale University, 1980. 190 pp.

Argues that the technology-specific component of skill makes the worker more useful to the innovative firm than elsewhere. Holds that the specific component of skill accounts for more than one third of the wage and that the rate of technical change is a function of workers' technology-specific skills.

6.110 Taylor, Robert E. and others, eds. *Jobs Training for Youth. The Contribution of the United States Employability Development System.* Columbus, Ohio State University, 1982. 453 pp.

A collection of papers dealing with the institutions involved with vocational training of young workers, job training systems in the military, the Comprehensive Employment and Training Act program, apprenticeship, job training in business and industry, and other topics.

6.111 Teich, Albert H. and Lambright W. Henry. "The Consequences of Limited University Growth." In National Science Foundation, *Annual Science and Technology Report to the Congress, 1980.* Washington, U.S. Government Printing Office, 1981, pp. 81-87.

The authors discuss the factors underlying declining growth, such as leveling-off of enrollments and Federal funds and the reduced value of endowments. They note the low retirement rates of existing faculties and the decline in employment opportunities for younger Ph.D.'s. They find increasing concentration of research, and divergence of academic research from graduate science education to be the likely consequence of these trends.

6.112 Tesar, Vladimir. "Training and Incentives to Training in the Czechoslovak Engineering Industry." *International Labour Review*, March-April 1981, pp. 201-214.

Describes changes in apprenticeship and adult worker training, the relation between trainees and their employers, the consolidation of training fields owing to technical changes, the retraining of workers, and upgrading of workers through training. Also discusses wage policy as training incentive.

6.113 Thrush, John C. and Smith, Philip R. *Japan's Economic Growth and Educational Change.* Lincoln, Neb., EBHA Press, 1980. 90 pp.

The authors examine the effect of Japan's rapid economic growth in the 1950's and 1960's upon the educational system. They find that this system became a hybrid, evolving from the interaction with growth.

6.114 Tucker, Irvin B. *Age, Income and Productivity. A Human Capital Profile Model.* Doctoral

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dissertation submitted to the University of South Carolina, 1982. 122 pp.

Argues that a discrepance exists between a worker's lifetime earnings and his age, income, and productivity of a specific point in time. Finds that workers receive wages below their productivity levels up to age 42, and above thereafter. Rejects the screening hypothesis, and holds that formal schooling enhances the relationship.

6.115 U.S. General Accounting Office. *The Army Needs to Modify its System for Measuring Individual Soldier Proficiency.* Report to the Secretary of the Army, Washington, March 30, 1982. 58 pp.

Offers a critique of the army's skill qualification test as a tool for measuring individual training effectiveness and proficiency in critical tasks. Finds that it is inadequate as a measure and too complex. Recommends alternatives.

6.116 Vetter, Betty M. "Women Scientists and Engineers: Trends in Participation." *Science*, December 18, 1981. pp. 1313–1321.

Examines the rise in women's educational attainment in science and engineering during the 1970's and their current employment status. Also discusses fields of science and engineering employment and salaries paid to women.

6.117 Wai, Hoi Sing. *The Impact of Health on Labor Supply.* Doctoral dissertation presented to Syracuse University, 1979. 200 pp.

Applies the concepts of impairment and functional limitation to assess the impact of poor health on labor supply. Develops a model and tests it empirically. Finds that an impairment affects productivity as well as potential market time.

6.118 Wallman, Sandra, ed. *Social Anthropology of Work.* New York, Academic Press, 1979. 397 pp.

A collection of essays discussing the organization, experience, and classification of work in pre-industrial, industrializing, and late industrial societies.

6.119 West, E.G. "Literacy and the Industrial Revolution." *Journal of Economic History*, August 1978, pp. 369–383.

Argues that there was a close association between rising literacy and the beginnings of the factory system in England. Rejects the assumption that literacy depended on a system of compulsory free education.

6.120 White, Rudolph A. "Has BLS Underestimated Business Ph.D. Demand?" *Monthly Labor Review*, September 1979, pp. 42–46.

Presents a critique of assumptions and methods underlying BLS projections of Ph.D. demand, especially as it affects business doctorates. Discusses pertinent data, holding BLS data bases to be inadequate. Also challenges BLS estimates of underutilization on logical grounds.

6.121 Wise, George. "A New Role for Professional Scientists in Industry: Industrial Research at General Electric, 1900–1916." *Technology and Culture*, July 1980, pp. 408–429.

Argues that scientists were not molded on an intellectual assembly line, nor shielded from the business environment. Describes the origins and characteristics of scientists attracted to industry. Discusses examples of outstanding researchers in the electric industry.

6.122 Work in America Institute. *Productivity Through Work Innovations.* New York, Pergamon Press, 1982. 161 pp.

Presents an overview of the forces underlying work innovations. The report deals with employee and employer perspectives as well as the launching, pilot-testing, diffusion, and institutionalization of work innovation, and offers recommendations.

6.123 Wozniak, Gregory D. *The Adoption Decision. A Human Capital Approach.* Doctoral dissertation submitted to Iowa State University, 1980. 94 pp.

Finds that increases in education and information enhance innovative ability, thus increasing the probability of adopting innovations. Also finds that operators are more aware of innovative factors when they can be applied to large-scale activities.

6.124 Young, Anne McDougall. "Trends in Educational Attainment Among Workers in the 1970's." *Monthly Labor Review*, July 1980, pp. 44–47.

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Presents data for 1970 and 1979 showing changes in educational attainment by race, sex, and level of education. Discusses the relation between education and unemployment, as well as to occupation.

6.125 Zalokar, Catherine N. *A Human Capital Model of Sex Differences in Occupational Distribution and Wages.* Doctoral dissertation submitted to Princeton University, 1982. 123 pp.

Examines causes of sex differences in occupations. Develops a human capital model and finds it suggests how changes in participation patterns of women lead to changes in the occupational distribution of men and women and in their relative wages.

6.126 Zuboff, Shoshanah. "Problems of Symbolic Toil." *Dissent*, Winter 1982, pp. 51–61.

Analyzes the experience of persons engaged in computer work. Discusses the relation between information technology and individual judgment, the abstraction from work and its stresses, and the management styles the computer generates.

Hours and work schedules

7.1 Allen, Steven G. "An Empirical Model of Work Attendance." *Review of Economics and Statistics*, February 1981, pp. 77–87.

Drawing on the 1972–73 Quality of Employment Survey, the author assesses the effect of monetary incentives and work scheduling flexibility on attendance. Finds direct relationships between the variables.

7.2 Bartel, Ann and Taubman, Paul. "Health and Labor Market Success: The Role of Various Diseases." *The Review of Economics and Statistics*, February 1979, pp. 1–8.

The authors estimate the effects of specific illnesses on wage rates and hours worked, as well as the persistence of these effects over time. They find earnings reductions of up to 30 percent associated with such diseases as heart ailments and psychoses around age 50 and during the last 10 years of working life.

7.3 Bednarzik, Robert W. "Worksharing in the U.S.: Its Prevalence and Duration." *Monthly Labor Review*, July 1980, pp. 3–12.

Argues that worksharing remains a comparatively rare practice. Presents a profile of the work sharer. Relates worksharing to unemployment, as well as to involuntary part time work.

7.4 Best, Fred. *Exchanging Earnings for Leisure. Findings of an Exploratory National Survey on Work Time Preferences.* R&D Monograph 79, Employment and Training Administration, U.S. Department of Labor. Washington, U.S. Government Printing Office, 1980. 184 pp.

Investigates the factors determining a person's choices between work time and leisure time. Finds increasing preference for less than full-time employment especially among women and youth. Discusses underlying social changes, implications for job satisfaction, and work quality.

7.5 Betancourt, R.R. and Clague, C.K. "An Econometric Analysis of Capital Utilization." *International Economic Review*, February 1978, pp. 211–227.

The authors present a model of shift work. They confirm the relation between size of plant and shift work in India and Israel, and present a measure of predictive performance.

7.6 Carlson, Norma. "Time Rates Tighten Their Grip on Manufacturing Industries." *Monthly Labor Review*, May 1982, pp. 15–22.

Reports on the relative decline in wage incentive plans and rise in time rate plans, as machine-paced production has expanded. Notes the coincidence of the decline with lagging productivity gains. Details incidence of incentive vs. time rate plans. Discusses quality of worklife programs as motivational forces.

7.7 Crocker, Thomas D. and Horst, Robert L. Jr. "Hours of Work, Labor Productivity and Environmental Conditions: A Case Study." *The Review of Economics and Statistics*, August 1981, pp. 361–377.

The authors examine productivity changes and consequent earnings adjustments occurring under differing working conditions for 17 citrus pickers in California. They study the effects of two environmental factors—ambient ozone and ambient temperature—upon their daily work performance.

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7.8 Davis, Howard. "Hours and Earnings of Production and Nonsupervisory Workers, 1968–78." *Monthly Labor Review*, April 1980, pp. 54–55.

In addition to reporting on trends in earnings, the author examines trends in average weekly hours, by major private sector. He finds hours to have dropped from 37.8 in 1968 to 35.8 in 1978.

7.9 Finn, Peter. "The Effects of Shift Work on the Lives of Employees." *Monthly Labor Review*, October 1981, pp. 31–35.

Discusses income and convenience benefits of shift work, as well as drawbacks, such as ill health, family problems, disrupted social life, and increased rates of accidents.

7.10 Goldberg, Gerald Frank. *An Econometric Analysis of Absenteeism in the United States.* Doctoral dissertation presented to the New School of Social Research, 1979. 215 pp.

Examines the economic effects influencing cross-sectional differentials in absence behavior. Finds the same level of earnings to reduce absences among women more than among men, but that other income reduces absences more among men than women.

7.11 Greis, Theresa D. *The Decline in Average Annual Hours of Work in the United States, 1947–1979.* Doctoral dissertation submitted to the University of Pennsylvania, 1982. 626 pp.

Presents data showing significant declines in annual hours worked by full-time workers, due chiefly to increased paid time off, and also to paid on-premises nonworking time. Argues that the resulting rising cost of labor causes companies to shift to higher utilization of capital and equipment and to use more contract labor.

7.12 Hedges, Janice Neipert, "Trends in Hours of Work, 1950 to 1979." In *Human Resources and Demographics: Characteristics of People and Policy. Special Study on Economic Change*, Vol. 1. Joint Economic Committee, U.S. Congress. Washington, U.S. Government Printing Office, December 12, 1980, pp. 169–185.

Discusses hours per worker, full- and part-time status, and hours at work. Also discusses hours per job, leave, and the workyear.

7.13 Hedges, Janice Neipert. "The Workweek in 1979: Fewer but Longer Workdays." *Monthly Labor Review*, August 1980, pp. 31–33.

Notes the compression of weekly hours into fewer days, especially where hours exceed 41 per week. Presents data on nonfarm workers usually working full time. Shows that the 4-day, 40-hour week has not become as prevalent as assumed in the early 1970's.

7.14 Hedges, Janice Neipert and Sekscenski, Edward S. "Workers on Late Shifts in a Changing Economy." *Monthly Labor Review*, September 1979, pp. 14–22.

The authors examine types of shift schedules and present data on shift workers by age, sex, marital status and other demographic variables. They also examine industries and occupations by prevalence of shift work.

7.15 Hedges, Janice Neipert and Taylor, Daniel E. "Recent Trends in Worktime: Hours Edge Downward." *Monthly Labor Review*, March 1980, pp. 3–11.

The authors discuss forces underlying reduced weekly hours, focussing on 1968–79. They discuss the theory of trade-off between work and leisure, historical trends, and recent experience. They assess the role of young workers and women workers in the decline of the overall average workweek.

7.16 Leslie, D.G. and Wise, J. "The Productivity of Hours in U.K. Manufacturing and Production Industries." *Economic Journal*, March 1980, pp. 74–84.

The authors investigate conflicting views about the productivity of overtime work, concluding that econometric models probably overestimate it.

7.17 Mark, Jerome A. *Assessing the Effects of Revised Workweek Schedules—Some U.S. Experiences.* Before the European Association of National Productivity Centers. Conference on the Management of Working Time. Belgrade, Yugoslavia, October 16, 1979. 15 pp.

Discusses a BLS pilot program aimed at studying the effects of compressed workweeks (4-day and 3-day) upon productivity, work quality, employee morale, and other factors. Describes such other purposes of the pilot study as the exploration of data availability,

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the variety of workweek scheduling and motivations underlying scheduling.

7.18 McCarthy, Maureen E. and Rosenberg, Gail S. *Work Sharing.* Case studies. Kalamazoo, Mich., W.E. Upjohn Institute for Employment Research, 1981. 277 pp.

The authors describe the experience of unionized and nonunionized firms using various forms of work sharing to avoid layoffs, adjust to skill shortages, adapt to changes in the work force, or achieve production flexibility. They explore reasons why employers might decide to permanently reduce work hours or to use flexible workshifts.

7.19 McGaughey, Jr., William. *A Shorter Workweek in the 1980's.* White Bear Lake, Minn., Thistlerose Publications, 1981. 308 pp.

Argues that shorter hours are a means to reducing unemployment. Also discusses labor displacement, work sharing, and objections to reduction of hours. Examines the impact of reduced hours on productivity and real income.

7.20 Mann, Barbara S. *Essays on the Economics of Shiftworking and Capital Utilization.* Doctoral dissertation submitted to the University of Rochester, 1982. 250 pp.

Explores firms' choice of technology in terms of using machines with differing labor requirements. Argues that shift work depends on basic wage rates and the relative price of labor-using capital. Develops a link between entrepreneurial talent, firm size, and capital utilization. Discusses the supply of shift workers, and the determination of hours worked. Offers estimates of shift premiums; and their relation to firm size and union status.

7.21 Nollen, Stanley D. *New Work Schedules in Practice: Managing Times in A Changing Society.* New York, Van Nostrand Reinhold, 1982. 281 pp.

Discusses nonstandard work schedules in terms of human resource management. Surveys the success and failure of compressed workweeks, flexitime, and job sharing. Analyzes economic costs of new work schedules. Also discusses the role of labor in introducing such schedules, effects on family life, and their management.

7.22 Owen, John D. "Hours of Work—Some Likely Effects of Future Reductions in the Workweek." In *Human Resources and Demographics: Characteristics of People and Policy. Special study on economic change.* Vol. 1. Joint Economic Committee, U.S. Congress. Washington, U.S. Government Printing Office, December 12, 1980, pp. 186-251.

Discusses recent changes in hours of work and examines the economic and social effects of reductions in work hours, including effects on the supply of labor inputs, leisure time, and total output. Also discusses policy implications.

7.23 Owen, John D. *Working Hours. An Economic Analysis.* Lexington, Mass., D.C. Heath, 1979. 206 pp.

Discusses low growth rates and actual scarcity in leisure time despite large productivity gains. Argues that leisure time is of low quality because of rigid work and institutional schedules.

7.24 Sekscenski, Edward S. "Job Tenure Declines as Work Force Changes." *Monthly Labor Review,* December 1979, pp. 48-50.

Examines length of time on current job by age, sex, and other demographic variables. Presents data on median years on current job by occupation and industry.

7.25 Sharp, Clifford. *The Economics of Time.* New York, Wiley, 1981. 231 pp.

Discusses the allocation of time in relation to work, income, and leisure. Also discusses time with respect to the utility of paid work and leisure, work sharing, and the use of nonworking time.

7.26 Silverstein, Pam and Srb, Jozetta H. *Flexitime: Where, When, and How?* Key Issue Series No. 24. Ithaca, N.Y., New York State School of Industrial and Labor Relations, 1979. 56 pp.

The authors present a historical survey of flexitime and examples of pilot flexitime programs. They also show how to set up flexitime schedules.

7.27 Stafford, Frank P. "Women's Use of Time Converging With Men's." *Monthly Labor Review,* December 1980, pp. 57-59.

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The author notes a decline in market hours worked by married women, even as their labor participation rate increased. He also points to decline in market hours worked by men, as well as a declining male participation rate. He discusses a convergence in the use of time, as shown by the way it is spent at work and at home.

7.28 Stamas, George D. "Percent Working Long Hours Shows First Post-Recession Decline." *Monthly Labor Review*, May 1980, pp. 39–42.

Examines recent trends in weekly hours worked in excess of 40 in industry and premium pay received. Discusses the uses of overtime. Also examines overtime worked by women and black workers, finding its incidence to be much lower than among white workers.

7.29 Taylor, Daniel E. "Absence from Working Among Full-Time Employees." *Monthly Labor Review*, March 1981, pp. 68–70.

Analyzes time lost from work by industry, occupation, personal characteristics of the worker, and by union status.

7.30 Taylor, Daniel E. "Absent Workers and Lost Hours, May 1978." *Monthly Labor Review*, August 1979, pp. 49–53.

Examines absence rates of full-time nonfarm workers by industry, occupation, and by reason for absence. Presents trend data from 1973 forward. Discusses proportion of usual time lost from work in terms of demographic variables.

7.31 Taylor, Daniel E. and Sekscenski, Edward S. "Workers on Long Schedules, Single and Multiple Jobholders." *Monthly Labor Review*, May 1982, pp. 47–53.

The authors examine the extent to which work schedules exceed the standard 40-hour week, finding that one in every four workers puts in more than 40 hours. They discuss the workweek of both single and multiple jobholders by industry and occupation.

7.32 Teriet, Bernhard. "Technical Progress and the Arrangement of Working Times." *Labour and Society*, April–June 1982, pp. 157–167.

Discusses alternative arrangements for flexible working time, questioning many conventional assumptions. Views as problematical the relation of technical progress to the availability of free time and control over working time.

Capital

8.1 Adams, J.D. "Relative Capital Formation in the United States." *Journal of Political Economy*, June 1980, pp. 561–577.

Finds that an increase in the rate of innovation alters capital formation in favor of schooling and other human capital formation.

8.2 Aivazian, Varouj A. and Callen, Jeffrey L. "Capacity Expansion in the U.S. Natural-Gas Pipeline Industry." *Productivity Measurement in Regulated Industries*. Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 145–159.

The authors develop an econometric model showing how capacity in the natural-gas pipeline industry would have grown in a period of expanding demand without regulation. They then develop a regulated variant of the model, finding that regulation affects optimal input combinations as well as capacity expansion, but that regulation as such has little effect on factor proportions in the industry.

8.3 Andreae, Roger B. *Vintage Production*. Doctoral dissertation submitted to Vanderbilt University, 1981. 107 pp.

Presents a vintage theory and model of manufacturing production, employment, and technological change. Argues that new plants are ever more productive in terms of labor services, and that existing plants become more productive over time as old equipment is replaced by more productive new equipment.

8.4 Andrews, Margaret S. *The Process of Accumulation in Agriculture and Its Relation to Postwar U.S. Economic Growth*. Doctoral dissertation submitted to the University of California, Berkeley, 1982. 217 pp.

Argues that structural changes in agriculture can be explained by accumulation at the firm level. Examines the possibility that rising capital intensity in agriculture negatively affected the growth potential of the U.S. economy, using input-output and capital stock data.

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8.5 Bailey, Martin Neil "The Productivity Growth Slowdown and Capital Accumulation." *American Economic Review*, May 1981, pp. 326–331.

Argues that low capital accumulation was not the cause of the slowdown in total factor productivity improvement during the 1970's, and that there was no need for a big push in capital spending to offset the slowdown.

8.6 Bailey, Martin Neil. "Productivity and the Services of Capital and Labor." *Brookings Papers of Economic Activity*, 1981, pp. 1–50.

Explores causes of the productivity slowdown of the 1970's. Argues that the slowdown was the result of a decline in capital services stemming from partial obsolescence due to rising energy prices. Also cites a decline in labor quality.

8.7 Beasley, David R. *Capital and the Automobile. A Case Study of Invention and Technological Diffusion.* Doctoral dissertation submitted to the New School for Social Research, 1982. 417 pp.

Examines reasons why the steam carriage automobile, invented in the 1820's, failed to take hold, in contrast to the steam railroads. Argues that British economic interests favored the concentration of capital in railroads, but opposed the decentralized capital represented by the automobile.

8.8 Belknap, John E. *Human Capital Accumulation by Rural Poor Families With Respect to Variation in Family Income.* Doctoral dissertation presented to the University of Wisconsin-Madison, 1979. 223 pp.

Investigates whether human capital can be improved through increases in income, and whether measured variation in family income explains variations in human capital. Finds, among other things, that cash transfers had no significant effect on human capital but that testing for sources of income, did.

8.9 Berson, David W. and Roley, Vance V. "Business Fixed Investments in the 1980's: Prospective Needs and Policy Alternatives." *Economic Review*, Federal Reserve Bank of Kansas City, February 1981, pp. 3–16.

The authors discuss investment requirements in light of slowed growth in capital stock. They investigate whether a shortfall from these requirements might occur and explore policy options.

8.10 Betancourt, Roger R. and Clague, Christopher K. *Capital Utilization: A Theoretical and Empirical Analysis.* New York, Cambridge University Press, 1981. 245 pp.

The authors examine long-run decisions, i.e., from the time of investment decision, to use capital stock. They present international comparisons of capital utilization, including the extent and characteristics of shift work.

8.11 Board of Governors of the Federal Reserve System. *Public Policy and Capital Formation.* Washington, April 1981. 326 pp.

A collection of essays discussing such subjects as postwar trends in capital formation, long run capital formation, the supply of saving, the demand for capital, and the market for capital.

8.12 Bosworth, Barry P. "Capital Formation and Economic Policy." *Brookings Papers on Economic Activity*, 2:1982, pp. 273–324.

Argues that the growth of capital stock has not slowed significantly and that only a trivial part of the productivity slowdown can be explained by this. Demonstrates the difficulty of using a neoclassical model to reconcile the halt in the growth of labor productivity, the sharp slowdown in the capital-labor ratio, the high level of the capital-output ratio, and the dip in the rate of return on capital.

8.13 Burmeister, Edwin. *Capital Theory and Dynamics.* New York, Cambridge University Press, 1980. 330 pp.

Focuses upon the analysis, characterization, and evaluation of dynamic paths, particularly those radiating from a given initial investment. Confines steady state paths to a restricted subset. Extensively discusses the "pure" role of time to analyze optimizing behavior.

8.14 Carmichael, Jeffrey. *The Role of Government Financial Policy in Economic Growth.* Doctoral dissertation presented to Princeton University, 1979. 245 pp.

Argues that economic development without a government sector is inefficient. Examines the impact of government financial policy on capital accumulation, focusing on debt as net wealth.

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8.15 Chishti, Salim Uddin. *Productivity and Capacity Utilization in the Manufacturing Sector of Pakistan.* Doctoral dissertation presented to Washington University, 1979. 206 pp.

Finds that increases in labor productivity derive from capital-labor substitution. Shows that underutilization prevented realization of scale economies, and examines reasons, such as shortages of skilled labor and foreign exchange constraints on imports.

8.16 Comptroller General of the United States. *An Analytical Framework for Federal Policies and Programs Influencing Capital Formation in the United States.* Report to the Congress. Washington, September 23, 1980. 80 pp.

Noting the importance of capital formation for the creation of jobs and for improving productivity, the report describes the means by which Federal policies, programs, and activities can affect the rate of capital formation.

8.17 Conrad, William E. and Cohen, Darrel S. "Inflation, Taxes, and the Capital Stock: A Long-Run Analysis." In *Public Policy and Capital Formation.* Washington, Board of Governors of the Federal Reserve System, April 1981, pp. 267–274.

The authors examine the channels by which anticipated inflation affects capital formation in terms of theories advanced by such students of the field as Tobin, von Mises, and Feldstein. They explore the effects on capital formation of the interaction of inflation with the tax system.

8.18 Corcoran, Patrick J. "Inflation, Taxes, and the Composition of Business Investment." In *Public Policy and Capital Formation.* Washington, Board of Governors of the Federal Reserve System, April 1981, pp. 191–200.

Argues that the composition of fixed investment has shifted toward less durable assets over the past 20 years, impairing the productivity and reducing the growth of total capital stock. Traces the cause to a tax system and inflation that discriminate against fixed investment.

8.19 Diewert, W.E. "Capital and the Theory of Productivity Measurement." *American Economic Review,* May 1980, pp. 260–267.

Surveys recent approaches to the measurement of total factor productivity. Considers modifications needed when no well-defined rental markets for components of the capital stock exist.

8.20 Eisner, Robert. *Factors in Business Investment.* National Bureau of Economic Research. Cambridge, Mass., Lippincott, Ballinger, 1978. 219 pp.

Presents and analyzes the individual returns from more than 700 companies to 14 annual surveys conducted by McGraw-Hill on actual and anticipated expenditures for plant and equipment and sales. Attempts to explain capital outlays in terms of past and expected sales changes, profits, depreciation, and other variables.

8.21 Everson, Carol K. *The Interrelationship of Utilization, Maintenance, and Investment Decisions with the Application to Railroad Freight Cars.* Doctoral dissertation presented to the University of Toronto, 1979. No pp. listed.

Specifies capital services flows which include the size of the capital stock, utilization rate, and the stock's reliability. Argues that the reliability level of the stock is influenced by the utilization rate, maintenance, and equipment installation and retirement rates. Examines trade offs between these variables, and derives the user costs of capital consistent with those trade offs.

8.22 Feldstein, Martin. "The Distribution of the U.S. Capital Stock Between Residential and Industrial Uses." *Economic Inquiry,* January 1981, pp. 26–37.

Measures the extent to which an increase in the total capital stock induces an increase in the stock of residential capital. Presents a statistical analysis from 1929 forward.

8.23 Feldstein, Martin. *Has the Rate of Investment Fallen?* Working Paper No. 679. Cambridge, Mass., National Bureau of Economic Research, 1981. 16 pp.

Argues that, while the ratio of gross fixed investment to GNP has remained stable since the late 1960's, the ratio of net nonresidential investment fell by nearly 40 percent between the second half of the 1960's and the second half of the 1970's, indicating a relative rise in depreciation.

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8.24 Field, B.C. and Grebenstein, C. "Capital-Energy Substitution in U.S. Manufacturing." *Review of Economics and Statistics*, May 1980, pp. 207–212.

The authors estimate factor demand for 2-digit manufacturing industries. They find reproductible capital and energy to be largely complementary inputs, while working capital and energy are generally substitutes.

8.25 Foss, Murray F. *Changes in the Workweek of Fixed Capital. U.S. Manufacturing, 1929–1976.* Washington, American Enterprise Institute, 1981. 104 pp.

Examines how an adjustment for average plant hours over time might alter existing measures of capital stocks and capital-output ratios. Analyzes factors accounting for changes in plant hours.

8.26 Frank, Andre Gunder. *Dependent Accumulation and Underdevelopment.* New York, Monthly Review Press, 1979. 226 pp.

Analyzes production and exchange relations in terms of dependence of underdeveloped countries upon developed ones. Distinguishes mercantilist, industrial and imperialist stages of capitalist development, analyzing each stage by the relations of production that characterize it.

8.27 Frank, Andre Gunder. *World Accumulation, 1492–1789.* New York, Monthly Review Press, 1978. 303 pp.

Examines relevant historical economic processes and their relationships. Investigates the effect of economic events on thought and the influence, in turn, of such thought upon accumulation.

8.28 Fraumeni, Barbara M. *The Role of Capital in U.S. Economic Growth.* Doctoral dissertation presented to Boston College, 1980. 440 pp.

Develops estimates for 46 industries in terms of six asset types and four forms of legal organizations. Includes accumulation and wealth accounts. Combines capital accounts with production, income, and expenditure accounts. Concludes that capital was a stable source of growth over the 1948–76 period studied.

8.29 Furstenberg, George M. von, ed. *Capital, Efficiency, and Growth.* Cambridge, Mass., Harper & Row, Ballinger, 1980, 561 pp.

Essays on such subjects as the role of capital in American growth since 1949, government-induced biases in the allocation of fixed capital, R&D in manufacturing and distribution of investment as between industries. The articles generally argue that capital investment is necessary to higher living standards and job opportunities.

8.30 Garnsey, Elizabeth. "Capital Accumulation and the Division of Labor in the Soviet Union." *Cambridge Journal of Economics*, March 1982, pp. 15–31.

Holds that the labor force structure in the Soviet Union is distinctive, although Western forms of occupational hierarchy have been adopted. Reviews other pertinent theories of Soviet labor force structure.

8.31 Harper, Michael J. *The Measurement of the Productive Capital Stock, Capital Wealth, and Capital Services.* BLS Working Paper No. 128, March 1982. 45 pp.

Compares various mathematical forms for the age-efficiency profile of a vintage aggregate. Reviews the theory of capital measurement, focussing upon the duality between the efficiency and the price of an asset. Constructs several efficiency functions and calculates their dual age-price profiles.

8.32 Hicks, John. "The Mainspring of Economic Growth." *American Economic Review*, December 1981, pp. 23–29.

Reviews the evolution of concepts that were first used in his "Theory of Wages." Discusses particularly the role of real wages in determining capital investment.

8.33 Johnson, Dana. "Capital Formation in the United States: The Postwar Perspective." In *Public Policy and Capital Formation.* Washington, Board of Governors of the Federal Reserve System, April 1981, pp. 47–58.

Traces the slowing in the growth of the nonresidential business capital stock during the 1970's to a shift to less durable capital and a reduction in the productivity of new capital due to increased government regulation.

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8.34 Johnson, Lewis. "Capital Formation in the Long Run." In *Public Policy and Capital Formation.* Washington, Board of Governors of the Federal Reserve System, April 1981, pp. 91–100.

Presents the standard neoclassical model of the growth in capital stock and its determinants. Discusses characteristics of the optimal capital-labor ratio, and defines adequacy of capital stock. Examines the influence of government.

8.35 Joines, Douglas H. *Government Fiscal Policy and Private Capital Formation.* Doctoral dissertation presented to the University of Chicago, 1979. No pp. indicated.

Finds that an increase in the tax rate on income from capital deters private investment, but no evidence that an increase in the tax rate on labor has such an effect. Also finds that an increase in government spending has a small deterrent effect on capital formation.

8.36 Kopcke, Richard W. "Capital Accumulation and Potential Growth." In *The Decline in Productivity Growth.* Proceedings of a conference. Boston, Federal Reserve Bank, June 1980, pp. 26–53.

Argues that slump in productivity and potential GNP growth since the mid 1960's resulted from slower rate of capital accumulation. Attributes the slump largely to inflation and rising business taxation. Proposes that policy insulate demand for capital from high inflation.

8.37 Kuipers, S.K. and others. "The Vintage Approach to Output and Employment Growth in the Netherlands, 1921–1976." *Weltwirtschaftliches Archiv,* 1979, pp. 485–507.

The authors build on analyses made in the early 1970's and enlarge the period of estimation. They conclude that the 1970's differ strongly from the 1930's in terms of the evolution of real wages and levels of gross investment.

8.38 Liebling, Herman I. *U.S. Corporate Profitability and Capital Formation, Are Rates of Return Sufficient?* New York, Pergamon Press, 1979. 146 pp.

Investigates the profitability of nonfinancial corporations over three decades and reviews pertinent literature. Finds that profitability declined in the 1970's, owing to certain structural changes that began in the 1960's.

8.39 Lubitz, Raymond. "Capital Formation and Saving in Major Industrial Countries." In *Public Policy and Capital Formation.* Washington, Board of Governors of the Federal Reserve System, April 1981, pp. 59–73.

Discusses the relation between economic growth and capital formation. Compares U.S. and foreign investment and savings data. Discusses the results in light of findings by Denison, Jorgensen, and other students of the subject.

8.40 Mandel, Ernest. *Long Waves of Capitalist Development: The Marxist Interpretation.* New York, Cambridge University Press, 1980. 151 pp.

Interprets long waves in terms of long-run movements in the rate of profit, which determines long-run movements in capital accumulation. Discusses the evidence and the demise of the postwar boom after 1968.

8.41 McKelvey, Michael J. "Constant-Dollar Estimates of New Plant and Equipment Expenditures in the United States, 1947–80." *Survey of Current Business,* September 1981, pp. 26–41.

Presents estimates for manufacturing and nonmanufacturing industries, as well as total nonfarm business. Notes an acceleration in the rate of increase in real plant and equipment spending for manufacturing for 1972–80 compared with 1947–72, but a significant slowdown nonmanufacturing industries, particularly in public utilities. Discusses cyclical behavior.

8.42 Musgrave, John C. "Fixed Capital Stock in the United States: Revised Estimates." *Survey of Current Business,* February 1981, pp. 57–68.

Presents current- and constant-dollar estimates of fixed nonresidential private and residential capital, 1925–79, and of government-owned fixed capital, 1959–79.

8.43 Nakamura, Toru. "Productivity Losses Through Capital Misallocation in the U.S., Japan, and West Germany." *The Quarterly Review of Economics and Business,* Autumn 1981, pp. 65–76.

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Argues that government-induced biases, resulting largely from favorable taxation of owner-occupied housing and double taxation of corporate profits, have contributed to slowing investment, hence have also retarded productivity advance in the United States. Offers comparisons with Japan and West Germany.

8.44 Neal, Alfred C. "Capital Investment and Tax Policy." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth.* New York, Van Nostrand Reinhold, 1981, pp. 142–168.

Discusses the role of decline in capital investment in the productivity slowdown of the 1970's and some reasons for the decline. Also discusses tax changes to stimulate investment.

8.45 Nemitz, William C. *Manufacturing Investment: A Three-Component Expectational Model.* Doctoral dissertation presented to Boston College, 1979. 153 pp.

Models manufacturing investment in terms of expansion of capacity, replacement of the capital stock, and adoption of technological change. Uses data from 11 leading firms over 30 years. Finds that the empirical results support the model's validity.

8.46 Norsworthy, J.R. and Harper, Michael J. "The Role of Capital Formation in the Recent Productivity Slowdown in Productivity Growth." In *Aggregate and Industry-Level Productivity Analyses.* Ali Gogmramaci and Nabil R. Adam, eds. Boston, Martinus Nijhoff, 1981, pp. 122–148.

The authors investigate the appropriate method for aggregating the components of capital stock. They discuss the growth in the capital-labor ratio, the link between capital and formation and labor productivity, and movements in the productivity of capital.

8.47 Norsworthy, J. Randolph. "Capital, Energy, and Productivity Research." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 171–181.

Explores the role of the linkage between capital investment and energy in the productivity slowdown of the 1970's. Analyzes the capital-energy relationship. Offers suggestions on future research directions and data needs.

8.48 Norsworthy, John R. "Capital Formation and the Growth of Labor Productivity." Testimony. In U.S. House of Representatives. *Capital Formation and Industrial Policy:* A compendium of papers presented to the Subcommittee on Oversight and Investigations of the Committee On Energy and Commerce. Washington, U.S. Government Printing Office, July 1981, pp. 361–387.

Discusses causes of the productivity slowdown since the mid 1960's, focussing on capital formation. Presents an analysis of the multifactor productivity framework formulated by the U.S. Bureau of Labor Statistics. Deals with measures of capital stock and related concepts.

8.49 Parry, Bruce E. *Soybeams as an Indicator of the Progress of Southern Agriculture Since the Second World War.* Doctoral dissertation presented to American University, 1980. 217 pp.

Discusses the concentration and centralization of capital in Southern agriculture, with soybeans, a crop highly adaptable to agricultural technology, as indicator of this movement. Investigates the accompanying displacement of smaller farms and the outmovement of the labor associated with them.

8.50 Penson, John B. and others. "Net Investment in Farm Tractors: An Econometric Analysis." *American Journal of Agricultural Economics,* November 1981, pp. 629–635.

The authors develop a measure of implicit rental price of tractors, accounting for farm capital structure, capacity depreciation and other factors. They compare net investment models for alternative capacity depreciation with engineering considerations.

8.51 Persky, J. "Dualism, Capital-Labor Ratios and the Regions of the U.S." *Journal of Regional Science,* December 1978, pp. 373–381.

Tests the proposition that regions are systematically capital-intensive across their manufacturing industries. Using 1965 capital-labor ratios, the author finds no support for this proposition, and also finds that there is dualism in regional economies, particularly in the South.

8.52 Pollard, Sidney. *The Wasting of the British Economy: British Economic Policy, 1945 to*

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the Present. New York, St. Martin's Press, 1982. 197 pp.

Examines the causes for the decline of the British economy, tracing it to neglect of investment. Argues a "contempt for production" as the main reason for that neglect.

8.53 Polshikow, P. *Capital Accumulation and Economic Growth in Developing Africa.* Moscow, USSR., Progress Publishers, 1981. 206 pp.

Examines the level, form, and mechanism of capital accumulation, as well as its pattern in individual sectors. Links the difficulties in accumulating capital to low social productivity of labor which in turn arises from scarcity of skilled jobs. Urges improvements in technology to raise labor productivity.

8.54 Rogers, Ken and others. *Capital Stock Estimates for Input-Output Industries: Methods and Data.* Bulletin 2034. Department of Labor, U.S. Bureau of Labor Statistics, 1979. Washington, U.S. Government Printing Office. 125 pp.

Discusses the choice of an estimation procedure, general requirements of the model, and relation to other series. Also analyzes the criteria for the investment series and their data sources, asset weights and service lives, and time paths of depreciation and discards. Presents industry data.

8.55 Rost, Ronald F. "Capacity-Neutral Investments and Capacity Measurement in Manufacturing." *The Journal of Industrial Economics,* June 1982, pp. 391–404.

Examines the effects of investments in pollution control and occupational health and safety on capacity measures (which conventionally ignore the outputs of such investments).

8.56 Sattinger, Michael. *Capital and the Distribution of Labor Earnings.* New York, North Holland, 1980. 281 pp.

Investigates the distribution of capital among jobs and the distribution of earnings among individuals. Critically analyzes human capital theory when used to explain the distribution of earnings.

8.57 Schefold, F. "Capital, Growth, and Definition of Technical Progress." *Kyklos,* 1979, pp. 236–250.

Argues the inconsistency of theories of growth and capital theory. Maintains that any theory of growth must be represented by specifying various concrete forms of technical change at the micro level, so that macro economic effects on labor productivity are derived from a classical theory of prices.

8.58 Scott, Maurice. "The Contribution of Investment to Growth." *Scottish Journal of Political Economy,* November 1981, pp. 211–226.

Discusses the claims of Edward Dennison and Robert Solow concerning the minor part investment plays in economic growth. Disputes these claims in the course of reconsidering the meaning of investment, maintenance, and depreciation.

8.59 Shemyatenkov, V. *The Enigma of Capital: A Marxist Viewpoint.* Moscow, U.S.S.R., Progress (Imported Publications, Chicago), 1981. 328 pp.

Offers a critique of the history of non-Marxist theories of capital, interest, profit, and economic growth. Describes alternative Marxist theories, based on Marx's law of surplus value. Discusses contributions of non-Marxist economists.

8.60 Steele, G.R. "The Relationship Between Gross Capital Stock and Net Capital Stock: An Assessment of the U.K. Time Series." *Oxford Bulletin of Economics and Statistics,* August 1980, pp. 227–234.

Demonstrates the effect of the investment growth rate and the life of capital assets upon the relative magnitudes of the net and gross capital stock. Stresses the conceptual differences between the statistical estimates of the two types of stock, warning against comparisons between the two without detailed investigation of factors determining asset life and asset mix.

8.61 Sundararajan, V. and Thakur, Subhash. "Public Investment, Crowding Out, and Growth: A Dynamic Model Applied to India and Korea." *International Monetary Fund Staff Paper,* December 1980, pp. 814–855.

The authors develop a model of investment, savings, and production to examine the effect of public investment on private investment. Among the model's features is the relation be-

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tween the relative cost of capital and capital productivity. They find that public investment in India crowds out private, while in Korea it promotes private investment.

8.62 Tampubolon, Hasudungan. *Capital Utilization in Manufacturing Industries in Indonesia.* Doctoral dissertation presented to Boston University, 1980. 370 pp.

Investigates why, despite shortages of capital in developing countries, the available stock of capital is underutilized. Traces underutilization to decision criteria of investors. Examines such criteria as profit maximization, wealth maximization, return on investment, payback period, and others. Finds the payback period criterion to be the most widely used. Holds this to be due to the high degree of uncertainty prevailing in developing country and the resultant desire to recover investments as rapidly as possible.

8.63 Thompson, Alexander McK. *Capital Accumulation in U.S. Coal: A Case Study of Labor, Technology and Competition.* Doctoral dissertation presented to Stanford University, 1979. 442 pp.

Traces the historical evolution of the coal industry. Discusses extractive technologies, the changing division of labor in the mines, the transformation of miners' skills, supervisor hierarchies, and other factors. Examines coal within the context of overall energy uses.

8.64 U.S. General Accounting Office. *Incentive Programs to Improve Productivity Through Capital Investments Can Work.* Report to the Secretary of Defense. Washington, April 20, 1981. 32 pp.

Examines results from the "fast payback" program, financed under Productivity Enhancing Incentive Fund in the Department of Defense. Argues the validity of the underlying concept of a specially funded program for capital investments with fast payback.

8.65 U.S. House of Representatives *Capital Formation and Industrial Policy.* A compendium of papers and reports presented to the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce. Washington, U.S. Government Printing Office, July 1981. 411 pp.

Presents discussions on trends in productivity, capital formation, growth, and supply-side policies. See also separate entries.

8.66 U.S. House of Representatives. *Capital Formation and Industrial Policy. Part I.* Hearings before the Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, April 27, 29; June 1, 22 and 24, 1981. Washington, U.S. Government Printing Office, 1981. 477 pp.

Includes statements, as well as additional materials submitted by various authorities on problems of capital formation and productivity. See also separate entries for the companion volume which includes papers and reports on these subjects.

8.67 Vatter, Harold G. "The Atrophy of Net Investment." *Journal of Economic Issues,* March 1982, pp. 237–254.

Presents evidence showing a decline in net fixed investment as a percent of net national product. Traces the reasons to persistent capital-saving innovations, holding that fixed capital has tended to become more productive. Discusses some implications for government policy.

8.68 Wachter, Michael L. and Wachter, Susan M., eds. *Toward a New U.S. Industrial Policy?* Philadelphia, University of Pennsylvania Press, 1981. 514 pp.

Research papers dealing with, among other things, capital formation, the retraining of workers, and high growth policies.

8.69 Wenban-Smith, G.C. "Factors Influencing Productivity Growth—Report on a Survey of Companies." *National Institute Economic Review,* 1982, pp. 57–66.

Reports that respondents to a survey found productivity advance in the 1960's to have been linked primarily to strong demand, but that in the 1970's capital investment became increasingly necessary for greater efficiency and competitiveness.

8.70 You, Jong Keun. "Capital Utilization, Productivity, and Output Gap." *The Review of Economics and Statistics,* February 1979, pp. 91–100.

Estimates cyclical fluctuations of inputs and their contribution to the gap between actual

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and potential output. Finds capital inputs to vary more than labor inputs at the aggregate level.

Technological change

9.1 Abelson, Philip H. "The Revolution in Computers and Electronics." *Science,* February 12, 1982, pp. 751–753.

Discusses computer cost and performance trends, software, information processing and distribution, communications, process control and manufacturing, and societal impacts.

9.2 Abernathy, William J. and others. "The Competitive Status of the U.S. Auto Industry." *The Bridge,* Fall 1982, pp. 20–24.

Members of a panel convoked by the National Academy of Engineering discuss historical aspects of the crisis in the automobile industry. They find that technology has been standardized, with technical advance having become minute; that the market for automobiles has become internationalized, and government regulation increased; and that foreign success has largely been based on competing technology rather than style.

9.3 Abernathy, William J. and others. "The New Industrial Competition." *Harvard Business Review,* September–October 1981, pp. 68–79.

The authors discuss the impact of internationally induced technological changes upon the automobile industry, arguing that Japanese management practices and systems related to production planning and control underlie the advantages of price and technology of Japanese automobiles.

9.4 Abzari, Mehdi. *Technology Transfer to Less Developed Countries: A Study of Agricultural Development in India Between 1961 and 1979.* Doctoral dissertation submitted to the United States International University, 1981. 126 pp.

Investigates the relation between technology transfer, economic development, and job market development. Examines, in particular, the link between agricultural machinery and gains in wheat and rice production, as well as between fertilizer use and these crops.

9.5 Alan, Richard. *Egypt's Agricultural Development, 1800–1980: Technical and Social Change.* Boulder, Colo., Westview Press, 1982. 296 pp.

Discusses the transformation of Egyptian agriculture from cotton cultivation in 1800 to the technical and social changes in recent decades. Analyzes the interaction between rural social classes, technological changes, government policies, and other factors.

9.6 Albach, Horst. "Average and Best Practice Production Functions in German Industry." *Journal of Industrial Economics,* September 1980, pp. 55–70.

Assumes a technology that is conceptually transferable between industries for long-run behavior, with identical production functions for firms, except for efficiency. Estimates average production function for the German chemical industry.

9.7 Allaby, Michael and Bunyard, Peter. *The Politics of Self-Sufficiency.* New York, Oxford University Press, 1980. 242 pp.

The authors explore political and philosophical aspects of self-sufficiency, discussing in particular technological progress in agricultural food production.

9.8 Altman, Stuart H. and Blendon, Robert, eds. *Medical Technology: The Culprit Behind Health Care Costs. Proceedings of the 1977 Sun Valley Forum on National Health.* Publication No. 79-3216. Department of Health and Human Services, 1979. Washington, U.S. Government Printing Office. 306 pp.

A collection of papers discussing such issues as the impact of medical technology on the per-unit costs of health care, cost implications of different types of medical technology, and uses of medical technology and cost-reducing incentives.

9.9 Altmeyer, Ann S. and Bozeman, Lisle S. "Productivity via Computer Technology." *Public Productivity Review,* December 1981, pp. 321–334.

After a general review of problems associated with computerized information systems, the authors discuss the design of two such systems introduced in New York State and the reaction of middle managers.

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9.10 Anderson, Letty D. *The Diffusion of Technology in the Nineteenth Century American City: Municipal Water Supply Investments.* Doctoral dissertation presented to Northwestern University, 1980. 238 pp.

Shows that major technological obstacles to successful waterworks construction had been overcome by 1870, and that competent civil engineers were becoming increasingly available, promoting the diffusion of waterworks technology.

9.11 Ashford, Nicholas A. and others. "Environment, Health, and Safety Regulation and Technological Innovation." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 161–221.

The authors discuss the sources of regulation as generated by technological innovations, as well as the characteristics of regulation and how they might, in turn, give rise to innovations.

9.12 Azhar, Rauf A. *Induced Technological Change in United States Manufacturing Industries.* Doctoral dissertation presented to McMaster University, 1980.

Explores the role of supply and demand forces in determining inventive activity. Investigates 11 manufacturing industries, empirical data and a simple model of induced technological change.

9.13 Bacon, Glenn. "Software." *Science.* February 12, 1982, pp. 775–779.

Contrasts progress in software with the much more rapid progress in computer hardware. Discusses reasons, including programmers' reluctance to change program language in which they have become proficient. Examines progress in program languages.

9.14 Bamakhrama, Ahmed S. *Policies for Transfer of Technology to Developing Countries: The Case of Middle Eastern Oil Exporting Countries.* Doctoral dissertation submitted to the University of Miami, 1981. 267 pp.

Analyzes social, cultural, and institutional factors affecting technology transfer; and cites some strategies Middle Eastern oil countries might follow to improve technology regarding foreign investment and licensing agreements. Finds such factors as high illiteracy, excessive bureaucracy, and dislike of manual work to retard effective technology transfer.

9.15 Barron, Iann and Curnow, Ray. *The Future With Microelectronics: Forecasting the Effects of Information Technology.* London, Pinter, 1979. 243 pp.

The authors evaluate the technological implications of developments in computer-based information systems and their consequences for government policy. They present relevant forecasts, and argue for redirection of government expenditures away from supporting the computing industry and toward existing technologies outside that industry.

9.16 Batavia, B. "The Estimation of Biased Technical Efficiency in the U.S. Textile Industry, X 1949–1974." *Southern Economic Journal.* April 1979, pp. 1091–1113.

Finds technological change to have been labor-saving, with combined increases in capital stock and decreases in labor inputs accounting for 8 percent of output growth. Attributes the remaining 92 percent to technical progress.

9.17 Behrman, Jack N. *Industry Ties With Science and Technology Policies in Developing Countries.* Cambridge, Mass., Oelgeschlager, Gunn & Hain, 1980. 205 pp.

Examines problems of implementing science and technology policies, focusing on the industrial sector, and possible contributions by transnational companies.

9.18 Bennett, Stuart. *A History of Control Engineering, 1800–1930.* New York, Peter Peregrinus, 1979. 214 pp.

Discusses the evolution of feedback devices, including governors, ship steering engines, navigational servomechanisms, regulators for electric lighting devices. Also discusses concepts underlying the control of electric circuitry and other fields.

9.19 Bennett, Clarence. *Productivity Through Technology. Summaries of Seven Nominations for Exemplary Practices in Federal Productivity.* Washington, Office of Personnel Management, February 1981. 9 pp.

Relates certain agency functions in productivity to technological change. Summarizes such examples as the use of a national elec-

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tronic injury surveillance system by the Consumer Product Safety Commission; an advanced personnel data system by the Defense Mapping Agency, and a grant program file system by the Department of Justice.

9.20 Berck, P. "Hard Driving and Efficiency: Iron Production in 1980." *Journal of Economic History*, December 1978, pp. 879–900.

Shows that technology in America was better than in Britain but that technical differences were not significant enough to account for Britain's relative decline as an industrial power.

9.21 Berg, Maxine. *The Machinery Question and the Making of Political Economy, 1815–1848.* Cambridge, Cambridge University Press, 1980. 379 pp.

Discusses the development of economies within its social and economic context. Argues the importance of Ricardo as the main theorist to incorporate technological change in economic theory. Investigates reasons for subsequent rejection of Ricardian theory and re-emphasis of Smith's theory of the division of labor.

9.22 Berger, Michael L. *The Devil's Wagon in God's Country.* Hamden, Conn., Archon Books, 1979. 269 pp.

Explores the impact of the automobile upon rural America, 1893–1929. Discusses early opposition to the auto, and eventual acceptance, which was related, in part, to improved health care made available to farmers as a result of the auto.

9.23 Bezilla, Michael. *Electric Traction on the Pennsylvania Railroad, 1895–1968.* University Park, Pennsylvania State University Press, 1980. 233 pp.

Examines the corporate deliberations, planning, technical solutions, and results of the electrification of the Pennsylvania railroad's New York, Philadelphia, Washington, and Harrisburg trunk lines.

9.24 Birnbaum, Joel S. "Computers: A Survey of Trends and Limitations." *Science*, February 12, 1982, pp. 760–765.

Discusses trends in computer hardware and architecture, input-output technology, software, and other pertinent subjects. Identifies complexity and relative programmer productivity as a limitation to be overcome by further research and design improvements.

9.25 Boon, Gerard K. *Technology and Employment in Footwear Manufacturing.* A Study Prepared for the International Labour Office within the Framework of the World Employment Programme. Germantown, Md., Sijhoff & Noordhoff, 1980. 216 pp.

Analyzes choice of manufacturing technologies in the footwear industry. Explores available technology for injected and built-up footwear. Examines technological behavior and strategies of national and multinational firms. Finds output mix to be sensitive to labor costs while industry concentration is moving to lower cost countries.

9.26 Boon, Gerard K. *Technology Transfer in Fibres, Textile and Apparel.* Alphen aan den Rijn (The Netherlands), Sijthoff and Noordhoff, 1981. 581 pp.

In addition to the international market mechanisms of technology transfers, the author discusses available technology, its main centers, and diffusion. Urges appropriate technologies for developing countries, and lessening of dependence upon advanced countries.

9.27 Boserup, Ester. *Population and Technological Change: A Study of Long-Term Trends.* Chicago, University of Chicago Press, 1981. 255 pp.

Argues that increases in population density tend to lower the costs for infrastructure, more than offsetting the effects of changes in the ratio of inhabitants to natural resources. Concludes that, therefore, population growth usually increases wealth, particularly by intensifying agricultural production.

9.28 Bourdon, Clinton C. "Labor, Productivity, and Technological Innovation: From Automation Scare to Productivity Decline." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 222–254.

Examines trends in productivity and technology and the relation of the trend in productivity to that in welfare as indicated by real wage changes. Also studies the impact of technological change upon employment and offers a microanalysis of productivity change.

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9.29 Boyne, Walter and Lopez, Donald, eds. *The Jet Age.* Washington, Smithsonian Institution Press, 1979. 190 pp.

A collection of lectures on the development of the jet engine. The authors deal with the turbojet, the axial flow engine, the first flight beyond the speed of sound, and the production of jet planes.

9.30 Branscomb, Lewis M. "Electronics and Computers: An Overview." *Science,* February 12, 1982, pp. 755–760.

Traces the growth in number and decline in size of computers and their relation to microelectronics. Discusses reasons for cost advantages of microelectronics. Analyzes programming problems and components, likely progress in their production, and rising programmer productivity. Also discusses office automation, communications, and information services.

9.31 Buchanan, R.A. *History and Industrial Civilization.* London, Macmillan, 1979. 200 pp.

Views as the central theme in the emergence of industrial civilization the surge in productivity and technological change that occurred in Europe from the mid-18th century onward.

9.32 Budhaka, Boonkerd. *Characteristics Associated With the Adoption of New Technologies in Thailand's Agriculture: A Discriminant Analysis.* Doctoral dissertation submitted to Washington State University, 1980. 171 pp.

Attempts to identify attributes associated with the adoption of new agricultural technologies in Thailand. Identifies fourteen attributes, classified as social, resource, and locational. Considers such technologies as new crop varieties, multiple cropping practices, and agricultural credit practices.

9.33 Bugliarello, George and Doner, Dean B., eds. *The History and Philosophy of Technology.* Urbana, University of Illinois Press, 1979. 384 pp.

A collection of essays discussing such subjects as the relation of engineer to scientists, continuity in the evolution of technology, origins of metallurgical inventions, and the relation between technology and society.

9.34 Bullough, Vern L. "A Brief Note on Rubber Technology and Contraception: The Diaphragm and the Condom." *Technology and Culture,* January 1981, pp. 104–111.

Traces the history of the condom and diaphragm as effects of the vulcanization process introduced in the 1840's. Analyzes reasons for the rapid diffusion of these devices.

9.35 Burke, Robert V. *The Diffusion of New Biological and Chemical Technologies and the Position of Small Farmers in Mexico.* Doctoral dissertation presented to the University of Toronto, 1978. No pp. indicated.

Investigates differences in the adoption of biological and chemical technologies between small and large farms, and the role of government extension services in overcoming the lag in adoption by small farms.

9.36 Buxton, N.K. and Aldcroft, D.H. *British Industry Between the Wars: Instability and Industrial Development, 1919–1939.* London, Scholar Press, 1980. 308 pp.

The authors discuss the role of technical innovation and development in the growth or decline of industrial sectors. They also discuss technical efficiency and present comparisons with foreign industries. Nontechnical constraints upon industrial growth are also examined.

9.37 Buzbee, B.L. and others. "Japanese Supercomputer Technology." *Science,* December 17, 1982, pp. 1189–1193.

The authors describe the purpose of Japanese research into supercomputers and planned and completed projects in which these computers are used. They urge intensified research on supercomputers in the United States.

9.38 Byatt, I.C.R. *The British Electrical Industry 1875–1914: The Economic Returns of a New Technology.* New York, Oxford University Press, 1979. 240 pp.

Discusses the economic reasons that led to investment in the electrical industry. Reviews the development of electric lighting and power for industry and traction.

9.39 Cain, Louis B. and Paterson, Donald G. "Factor Biases and Technical Change in Manufacturing: The American System,

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1850–1919." *The Journal of Economic History*, June 1981, pp. 341–360.

The authors argue that biased technical change characterized manufacturing development. They demonstrate the existence of labor-saving, capital-using, as well as material-using biases, with wide variations among individual industries.

9.40 Carlsson, Bo and others. *The Importance of Technology and the Permanence of Structure in Industrial Growth.* Stockholm, Sweden, Almqvist and Wicksell, 1978. 237 pp.

A collection of research papers dealing with the specifications of production relations, with reference to the theoretical framework, measurement, data, and estimation. Integrating engineering information with economic reasoning is stressed.

9.41 Chamot, Dennis. "Technology: How European Unions Cope." *The AFL-CIO American Federationist*, November 1981, pp. 13–15.

Emphasizes employers' interest in new technological developments as a means to increase productivity and halt the growth in personnel. Discusses some institutional measures available to unions in Sweden and Germany to cope with the resulting displacement potential.

9.42 Chamot, Dennis and Baggett, John M. eds. *Silicon, Satellites, and Robots. The Impact of Technological Change on the Workplace.* Washington, Department for Professional Employees, AFL-CIO, September 1979. 52 pp.

Presents articles on the effects and measurement of technological change and productivity in such industries as telephone communications, printing, and railroads. Also discusses training, education, employment policy, and quality of worklife under changing technological conditions.

9.43 Christensen, C. Paul. "Some Emerging Applications of Lasers." *Science*, October 8, 1982, pp. 115–121.

Discusses the proliferation of laser applications in all fields of natural science. Considers special areas of applications, such as microchemistry, optical disk data storage, and remote sensing.

9.44 Coates, Vary, Finn, Bernard, et al. *A Retrospective Technology Assessment: Submarine Telegraphy—the Transatlantic Cable of 1866.* San Francisco, San Francisco Press, 1979. 264 pp.

The authors provide a history of the transatlantic cable and an assessment of its social and economic effects, especially among user groups.

9.45 Cockroft, David. "New Office Technology and Employment." *International Labour Review*, November–December 1980, pp. 689–704.

Surveys office tasks susceptible to automated procedures. Discusses impact on employment and productivity in the "paperless office" brought about by the use of word processors, small computers, and sophisticated office communications systems.

9.46 Compaine, Benjamin M. *The Newspaper Industry in the 1980's: An Assessment of Economics and Technology.* White Plains, N.Y., Knowledge Industry Publications, 1980. 287 pp.

Examines the economic health of newspapers, their prospects for continuing in their present form, the impact of new technology, labor-management relations, and other factors affecting productivity.

9.47 U.S. General Accounting Office. *Greater Use of Innovative Building Materials and Construction Techniques Could Reduce Housing Costs.* Report to the Congress by the Comptroller General of the United States. Washington, February 18, 1982. 66 pp.

Details possible cost savings in housing construction by use of materials and techniques such as underfloor plenum heating, plastic piping, and wider spacing and studs. Discusses impediments to such use arising from industry and government policies and low levels of effort.

9.48 U.S. General Accounting Office. *Implications of Electronic Mail for the Postal Service's Work Force.* Report to the Congress by the Comptroller General of the United States. Washington, February 6, 1981. 57 pp.

Assesses impact of electronic mail, customer presort programs, mail diversion to alternative delivery systems, and possible cutbacks of delivery days on postal employment. Dis-

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cusses postal service's possible role in electronic mail.

9.49 "Computers and Electronics." *Science*, February 12, 1982. Entire issue.

Presents articles on computer trends, graphics and software, the impact of computers on scientific research and medicine, business and industry communications, personal service, and information storage and retrieval.

9.50 Constant II, Edward W. *The Origins of the Turbojet Revolution*. Baltimore, The Johns Hopkins University Press, 1980. 311 pp.

Recounts the evolution of propeller-driven planes to jet planes. Hypothesizes the existence of a "normal" technology, whose evolution indicates certain limits, compelling the search for alternatives. Discusses the development of the turbojet engine. Shows it to have been largely outside the "normal" technology.

9.51 Coughlin, Cletus C. *Technology Transfer to Yugoslavia via Joint Ventures*. Doctoral dissertation submitted to the University of North Carolina at Chapel Hill, 1981. 229 pp.

Using a case study approach, explains why legislation in Yugoslavia in 1967 allowing foreign investment through minority joint ventures did not succeed in stimulating transfer of sophisticated technology. Offers hypotheses concerning the behavior of multinational firms, and their reluctance to transfer technology except through wholly owned subsidiaries.

9.52 Dahlman, Carl J. *A Microeconomic Approach to Technical Change: The Evolution of the Usiminas Steel Firm in Brazil*. Doctoral dissertation presented to Yale University, 1979. 406 pp.

Investigates the nature of technical change in terms of a firm's production objectives and the extent to which it is dependent on new capital equipment rather than modifications to existing equipment. Also examines the relation between a firm's R&D effort, and its technological strategy.

9.53 Das, Ram. *Appropriate Technology. Precepts and Practices*. New York, Vantage Press, 1981. 311 pp.

Discusses essential aspects of appropriate technology, presenting case studies of its application in agricultural processing, dairy farming, cottage industries, and other settings in India. Holds that a strategy of appropriate technology can overcome capital scarcity and strengthen the economy.

9.54 Davis, Ruth M. "Computers and Electronics for Individual Services." *Science*, February 12, 1982, pp. 852-855.

Describes the genesis and evolution of personal computers, focusing on portability of terminals, declining costs, and spreading popularity of electronic games. Discusses applications in music, for mail, and personal use.

9.55 DeBessonet, Cary; Hintze, James; and Waller William. "Automated Retrieval of Informatin: Toward the Development of a Formal Language for Expressing Statutes." *Southern University Law Review*, Fall 1979, pp. 1-14.

The authors describe research to develop a communicative process involving legal textual materials. They also discuss existing legal retrieval systems.

9.56 Demain, Arnold L. and Solomon, Nadine A. "Industrial Microbiology." *Scientific American*, September 1981, pp. 66-75.

A survey of the history of fermentation and of microorganisms in which the authors discuss commercial applications of microbial cells, pertinent industrial processes, and the potential of genetic manipulation.

9.57 Dennis, Richard L. *Essays in the Theory of Endogenous Technical Change*. Doctoral dissertation submitted to Tulane University, 1981. 78 pp.

Considers several models of endogenous technical change and their inducement properties. Discusses technological production functions, maximizing cost reduction, R&D budget constraint effects, profit maximization, and other inducement properties.

9.58 Denny, M. and others. "Estimating the Effects of Diffusion of Technological Innovations in Telecommunications: The Production Structure of Bell Canada." *Canadian Journal of Economics*, February 1981, pp. 24-43.

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The authors estimate the cost-reducing effects of the diffusion of innovations through a telecommunications network, choosing direct distance dialing and modern central office switching as examples. They develop indicators of technological advance, methods for allocating production costs, and other techniques.

9.59 Derakhshani, Shidan. *Structuring International Transfers of Technology: Lessons from Iran.* Doctoral dissertation presented to Harvard University, 1980. 438 pp.

Explores the variance in objectives between the supplier and recipient of technology and the costs this generates. Examines such characteristics of the relationship as the location of the supplier, personal interactions, and the effects of learning and production experience. Concludes that the recipient should strive for greater autonomy from the technology supplier.

9.60 Dertouzos, Michael L. and Moses, Joel. *The Computer Age: A Twenty-Year View.* Cambridge, MIT Press, 1979. 491 pp.

A collection of essays exploring present and future computer trends in the shoe industry, the Federal Government, in politics, and in the multinational firm. The authors also discuss the diffusion of the computer owing to its declining price, and the computer as the centerpiece of the "information society."

9.61 DeVore, Paul W. *Technology: An Introduction.* Worcester, Mass., Davis, 1980. 399 pp.

Holds that technology is the study of the creation and use of adaptive means, including tools, machines, and materials. Discusses technology as a social process.

9.62 Diebold, John. "Increasing Office Productivity Through Information Technology." In Jerome W. Rosow, ed. *Productivity: Prospects for Growth.* New York, Van Nostrand Reinhold, 1981, pp. 169–191.

Details the current state of office automation as related to costs and decentralizing trends—including computing and word processing systems; printing, copying and communications; facsimile and message switching systems; and word processing and photocomposition systems.

9.63 Doctors, Samuel I., ed. *Technology Transfer by State and Local Government.* Cambridge, Mass., Oelgeschlager, Gunn & Hain, 1981. 262 pp.

A collection of papers discussing topics such as the influence of Federal programs and the role of the private sector in diffusing and transferring technology, methods of facilitating private involvement through venture capital assistance, selective use of government procurement, and consultation assistance to new firms.

9.64 Doraswamy, Gorantla. *Mechanization and Its Effect on the Demand for and Supply of Agricultural Labor in the Chittoor District of India.* Doctoral dissertation presented to Cornell University, 1979. 200 pp.

Analyzes determinants of labor demand and mechanization effects on family labor supply. Finds that family and hired labor supply was determined by per capita income, the educational level of the head of family, and the labor requirements for a given operation.

9.65 Dorf, Richard C. and Hunter, Yvonne L., ed. *Appropriate Visions: Technology, the Environment and the Individual.* San Francisco, Boyd & Fraser, 1978. 351 pp.

A collection of essays stressing decentralization of economic and technological decision-making, the efficiency of small-scale production, and the consequences of centralized production systems, especially in energy.

9.66 Dunn, Peter D. *Appropriate Technology: Technology with a Human Face.* New York, Schocken Books, 1979. 220 pp.

Examines appropriate technologies for combatting poverty in developing countries, urging job creation by means of small-scale, low-cost projects. Also investigates social aspects of development and technology.

9.67 Ellul, Jacques. *The Technological System.* New York, Continum, 1980. 362 pp.

Examines the effect of technology upon society, viewing technology in terms of its flexibility, interrelatedness, evolutionary capabilities, and other characteristics.

9.68 Englander, Alfred S. *Technology Transfer and Development in Agricultural Research Pro-*

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grams. Doctoral dissertation submitted to Yale University, 1981. 301 pp.

Argues that the transfer of technology from developed to developing countries is influenced by choice, and depends on research policies in both the originating and the adopting country. Notes that resources for research are required and examines the effect of technology transfers on productivity.

9.69 Enke, C.G. "Computers in Scientific Instrumentation." *Science,* February 12, 1982, pp. 785–791.

Traces instrument computerization, culminating in the incorporation of microprocessors in instruments. Also examines problems of data collection and storage.

9.70 Ernst, Martin L. "The Mechanization of Commerce." *Scientific American,* September 1980, pp. 133–147.

Traces and examines the effect of automation in banking and finance, detailing major technologies. Also discusses automation in the transportation, telecommunications, and retailing industries. Notes labor displacement effects.

9.71 Esper, Thomas. "Industrial Serfdom and Metallurgical Technology in 19th Century Russia." *Technology and Culture,* October 1982, pp. 583–608.

Links the backwardness of metallurgical technology to the use of servile labor, which discouraged the introduction of modern technology. Notes the inefficient management of the work force owing to the obligation to employ all available labor.

9.72 Evans, Francis. "Roads, Railways, and Canals: Technical Choices in 19th Century Britain." *Technology and Culture,* January 1981, pp. 1–34.

Compares the advantages and disadvantages of the three modes of transport, as they appeared to users. Details many of the technical differences.

9.73 Fairley, Lincoln. *Facing Mechanization. The West Coast Longshore Plan.* Los Angeles, Institute of Industrial Relations, University of California, 1979. 447 pp.

Traces the history of and evaluates the 1960 mechanization and modernization (containerization) agreement between the longshoremen's union and maritime employers.

9.74 Ferdows, Kasra and Rosenbloom, Richard S. "Technology Policy and Economic Development: Perspectives for Asia in the 1980's." *Columbia Journal of World Business,* Summer 1981, pp. 36–45.

The authors discuss the complementary role that imported technology and indigenous learning should play in the promotion of economic development in Asia, drawing on Japan as an example. They examine productivity as a major source of growth, reviewing the factors underlying productivity improvement.

9.75 Florman, Samuel C. *Blaming Technology: The Irrational Search for Scapegoats.* New York, St. Martin's Press, 1981. 207 pp.

Rebuts the deterministic view that new technology forces itself upon society, emphasizing the human development of technological change. Rejects the idea of a technocracy and a technocratic elite.

9.76 Foeller, W.H. "A Note on Technological Change and the Interindustry Propensity to Strike in U.S. Manufacturing Industries." *Nebraska Journal of Economics and Business,* Winter 1980, pp. 52–62.

Finds that rapid technological change tends to dampen the propensity to strike.

9.77 Forester, Tom, ed. *The Microelectronics Revolution: The Complete Guide to the New Technology and its Impact on Society.* Cambridge, Mass., The M.I.T. Press, 1981. 589 pp.

Contains a large number of essays discussing the evolution of the microelectronics industry and its production processes, its impact on office work, on employment, on industrial relations, and its place in an "information society."

9.78 Furter, William F., ed. *A Century of Chemical Engineering. Papers from a Symposium, Las Vegas, August 1980.* New York, Plenum, 1982. 464 pp.

Symposium papers dealing with chemical engineering practices in the United States, England, Germany, France, and South Africa. The authors discuss chemical engineering edu-

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cation and the efforts at self-sufficiency in chemical technology in several countries.

9.79 Ganguly, Pradeep. *Social Rates of Return and Distributional Aspects of Tobacco Harvest Mechanization in South Carolina.* Doctoral dissertation presented to Clemson University, 1980. 156 pp.

Investigates whether the benefits of new tobacco harvest mechanization practices exceeded its costs and whether the benefits of change were distributed equitably. Finds that pertinent investments have satisfied the criteria of efficiency and equity.

9.80 Gehlen, Arnold. *Man in the Age of Technology.* New York, Columbia University Press, 1980. 224 pp.

Traces technology to man's inability to adapt to his natural environment. Holds that technology is a substitute for organic activities and is essential for cultural development.

9.81 Ginzberg, Eli. "The Mechanization of Work." *Scientific American,* September 1982, pp. 66–75.

Discusses how mechanization has been dealt with by economists, what its effects have been on the American economy, and what its impact has been on the structure and character of the labor force and work environment.

9.82 Giuliano, Vincent E. "The Mechanization of Office Work." *Scientific American,* September 1982, pp. 149–165.

Provides a brief history of office routine mechanization. Discusses changes in productivity and office production methods and describes some of the economics of office automation.

9.83 Globerman, Steven. *The Adoption of Computer Technology in Selected Canadian Service Industries: Case Studies of Automation in University Libraries, Hospitals, Grocery Retailing and Wholesaling, and Department and Variety Stores.* Ottawa, Economic Council of Canada, 1981. 53 pp.

Provides a comparative analysis of the introduction of automation in Canada and the United States in selected service industries. Finds that hospitals and department stores are more highly automated in the United States than in Canada.

9.84 Gold, Bela. "Technological Diffusion in Industry: Research Needs and Shortcomings." *The Journal of Industrial Economics,* March 1981, pp. 247–269.

Surveys the literature of the past 20 to 25 years with respect to the research needs and shortcomings of technological diffusion in industry.

9.85 Goldstein, Charles M. "Optical Disk Technology and Information." *Science,* Feb. 12, 1982, pp. 862–868.

Describes the development and potential of optical digital disks for computer mass storage. Discusses recording and storage technology and implications for information storage and retrieval.

9.86 Graham, Edward M. "Technological Innovation and the Dynamics of the U.S. Comparative Advantage in International Trade." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 118–160.

Discusses the influence of technological change upon international commerce. Assesses changes in trade patterns and its impact on the United States. Examines policies that would improve the U.S. trade position.

9.87 Gray, Martha M. *Computer Science and Technology: Computers in the Federal Government: A Compilation of Statistics.* Institute for Computer Sciences and Technology, National Bureau of Standards. Washington, U.S. Government Printing Office, April 1979. 83 pp.

Discusses and provides data on the number of computers installed by the Federal Government, their dollar value, and costs of operation by agency.

9.88 Greenberg, Edward, and others. *Regulation, Market Prices, and Process Innovation: The Case of the Ammonia Industry.* Boulder, Colo., Westview Press, 1979. 241 pp.

The authors offer a case study of historical change in the technologies used in the production of synthetic anhydrous ammonia. They focus on the industry's response to Gov-

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ernment regulation of the work place and environmental quality.

9.98 Gunn, Thomas G. "The Mechanization of Design and Manufacturing." *Scientific American*. September 198?, pp. 115–131.

Argues that the productivity of factory workers hinges largely on the design of the product and the way resources of labor, machines, and raw materials are brought together. Traces role of the computer in manfacturing operations, and discusses programming of machine shop work and flow of information. Describes a completely automated factory.

9.90 Gunnell, John G. "The Technocratic Image and the Theory of Technocracy." *Technology and Culture*. July 1982, pp. 392–416.

After tracing the general contours of the image of technocracy, the author analyzes recent theories of technocracy, and the political ideals informing it. He argues that the founders of the United States believed in a type of political technology that could be complementary with popular institutions, and that this belief underlay subsequent technocratic movements.

9.91 Haas, Warren J. "Computing in Documentation and Scholarly Research." *Science*. February 12, 1982, pp. 857–861.

Discusses the transformation of the production, organization, and delivery of publications of all types by computer and communications technology. Notes the great volume of publications in existing machine-readable form and problems related to it. Describes applications in publishing, cataloging, indexing, and accessing.

9.92 Hanle, Paul A. *Bringing Aerodynamics to America*. Cambridge, Mass., MIT Press, 1982. 184 pp.

Describes the transmission of German research methods in applied hydrodynamics and aerodynamics to the United States. Explores reasons for this transfer and deals with the personalities surrounding it.

9.93 Hawkins, Robert G. and Prasad, A.J., eds. *Technology Transfer and Economic Development*, Vol. 2 of *Research in International Business and Finance*. Greenwich, Conn., JAI Press, 1981. 305 pp.

A collection of papers dealing with conflicts between governments and firms regarding technology transfer, definitional issues, impact of technology transfer on economic performance of Japan and other advanced countries, and other issues.

9.94 Headrick, Daniel R. *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century*. New York, Oxford University Press, 1981. 221 pp.

Argues that there is a relation between the shallow-draft, steam-powered gunboat and the prophylactic use of quinine, and the first penetration of Asia and Africa by European powers. Links revolutionary advances in firearms to the ability of Europeans to conquer non-Western peoples. Also relates the emergence of steamship lines and the submarine cable to the spread of communications, transportation and other control networks.

9.95 Hessel, Helena. *The Role of Technology Transfer in Polish Development Strategy in the 1970s: The Econometric Analysis of Productivity Differential of Western and Domestic Capital in Polish Industry*. Doctoral dissertation submitted to Columbia University, 1981. 170 pp.

Evaluates the extent and impact of large-scale Western technology imports. Finds thats the productivity gap between imported and domestic technology, as embodied in capital goods, is generally not significant, the higher marginal productivity of Western capital goods not being maintainable. Argues that Polish industry is unable to absorb and diffuse high-level technology.

9.96 Omitted.

9.97 Holliday, George D. *Technology transfer to the USSR, 1928–37 and 1966–75: The Role of Western Technology in Soviet Economic Development*. Boulder, Colo., Westview Press, 1979. 225 pp.

Examines Soviet experience in borrowing foreign technology. Studies the role of Western technology, its impact on Soviet attitudes, policies, and institutions. Finds that Western technology has made major contributions, but that its absorption has been slow and inefficient.

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9.98 Hopwood, David A. "The Genetic Programming of Industrial Microorganisms." *Scientific American.* September 1981, pp. 91–102.

Discusses progress and problems of genetic programming and underlying technologies.

9.99 Hudson, C.A. "Computers in Manfacturing." *Science.* February 12, 1982, pp. 818–825.

Advocates the integration of the "islands of automation" currently characterizing manufacturing. Describes advances in computer-aided design and manfacturing. Discusses robotics, predicting declining costs. Also deals with social impacts.

9.100 Hunter, Lewis C. *A History of Industrial Power in the United States.* Vol. 1. *Waterpower in the Century of the Steam Engine.* Charlottesville, University Press of Virginia, 1979. 606 pp.

Discusses three epochs of waterpower: Millpower, industrial waterpower, and steam power. Defines geographical, social, and economic contexts and examines reasons why waterpower declined despite growing efficiency of pertinent technologies.

9.101 Ishikawa, Shigeru. *Essays on Technology, Employment, and Institutions in Economic Development: Comparative Asian Experience.* Tokyo, Kinokuniya, 1981. 466 pp.

Deals with labor absorption in developing Asian countries, technological change in agricultural production and its impact on agrarian structure. Discusses how Japan identified and developed technologies in the face of Western competition. Examines appropriate technology in tractor and power tiller industries in Southeast Asia.

9.102 "Industrial Microbiology." *Scientific American.* September 1981. Entire issue.

Presents articles on the microbiological production of food and drink, pharmaceuticals, and industrial chemistry. Also features articles on production methods in industrial microbiology, and on agricultural microbiology.

9.103 International Rice Research Institute. *Economic Consequences of the New Rice Technology.* Los Banos, The Philippines, 1978. 402 pp.

A collection of papers appraising the social impact of the development, diffusion, output, and supply of modern rice varieties in Asia. Also discusses labor, mechanization, and other topics related to rice production in Asia.

9.104 Just, Richard E. and others. "Technological Change in Agriculture." *Science.* December 14, 1979, pp. 1277–1280.

Discusses technological change in agriculture and its impact on income distribution, wealth accumulation, farm size, the environment, rural communities, and the general welfare. Also discusses adverse effects, such as worker displacement.

9.105 Kamrany, Nake M. and Day, Richard H., eds. *Economic Issues of the Eighties.* Baltimore, The Johns Hopkins Press, 1979. 286 pp.

A collection of papers dealing with the relationship of technology and energy to labor productivity and economic growth, Soviet economic development, and related subjects.

9.106 Kebabian, Paul B. and Lipke, William C., eds. *Tools and Technologies: America's Wooden Age.* Burlington, University of Vermont, 1979. 111 pp.

A collection of essays which discuss subjects such as the transition from hand to machine production in the fashioning of wooden articles, processes of woodworking and the interrelation of tools used in them, cabinetmaking, and mechanization in the manufacture of furniture.

9.107 Keddie, James and Cleghorn, William. *Brewing in Developing Countries.* Edinburgh, Scottish Academic Press, 1979. 245 pp.

The authors explore the choice of technology for brewing and bottling of beer, emphasizing the importance of direct and indirect job creation. They examine the industry's employment contribution, as well as costs.

9.108 Keddie, James and Cleghorn, William. *Brick Manufacture in Developing Countries.* Edinburgh, Scottish Academic Press, 1980. 134 pp.

The authors evaluate choice of techniques in producing common brick and examine productivity levels. They argue that traditional labor-intensive processes are also lowest cost processes.

9.109 Kenwood, A.G. and Lougheed, A.L. *Technological Diffusion and Industrialization Before*

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1914. New York, St. Martin's Press, 1982. 216 pp.

The authors argue that countries industrialize at different times because of differing social, economic, and political conditions. They discuss the role of the state in the 19th century and its impact on the industrialization of latecomers. They maintain that obstacles to development have increased in the 20th century, and that stronger mechanisms for the diffusion of technology are required.

9.110 Kouvenhoven, John A. "The Designing of Eads Bridge." *Technology and Culture,* October 1982, pp. 535–568.

Traces the history of designing the bridge spanning the Mississippi at St. Louis, together with the machinery used to construct the bridge, and the difficulties encountered in the construction. Discusses such aspects as the unprecedented length of span, the use of underwater apparatus in laying the foundations, and knowledge of materials.

9.111 Krammer, Arnold. "Technology Transfer as War Booty: The U.S. Technical Oil Mission to Europe, 1945." *Technology and Culture,* January 1981, pp. 68–105.

Describes early synthetic fuel research in Germany showing how German industrial secrets bearing upon fuel production were used by the United States.

9.112 Lall, Sanjaya. *Developing Countries as Exporters of Technology. A First Look at the Indian Experience.* Atlantic Highlands, N.J., Humanities Press, 1982. 134 pp.

Focuses upon India's export of manufacturing, construction, management, and other forms of technology. Examines the processes of assimilation underlying the entry of developing countries into foreign markets. Discusses issues of comparative advantage. Holds that the promotion of domestic technology requires limited protection against imports.

9.113 Laver, Murray. *Computers and Social Change.* Cambridge, Cambridge University Press, 1980. 123 pp.

Examines such topics as labor relations and automation, data banks and privacy, computer assisted instruction, computer crime, and military uses. Also discusses the problems of computer modeling.

9.114 Lecraw, D.J. "Choice of Technology in Low Wage Countries: A Nonneoclassical Approach." *Quarterly Journal of Economics,* November 1979, pp. 631–654.

Finds that many firms in Thailand choose expensive technology having a high degree of inefficiency. Hold that such inefficiency is a function of projected profits, ownership structure, and managers' perception of risk of technological failure.

9.115 Lee, Kay K. *The Effects of Technological Developments on International Trade: The Case of the U.S. and Japanese Steel Industries.* Doctoral thesis presented to Rutgers University, The State University of New Jersey (New Brunswick), 1979. 141 pp.

Estimates constant elasticity of substitution functions for the American and Japanese steel industries. Argues that the main reason for rising steel imports from Japan has been lagging absorption of new technology in the United States.

9.116 Lee, Len. "How to Achieve and Maintain White-Collar Productivity." *Journal of Systems Management,* March 1981, pp. 9–11.

Discusses the establishment of productivity standards when converting a paper record system to micrographics.

9.117 Levine, Ronald, D. "Supercomputers." *Scientific American,* January 1982, pp. 118–135.

Describes the logical organization of supercomputers and discusses the mathematical problems such computers are designed to deal with, such as arise in aerodynamics, meteorology, and plasma physics.

9.118 Levitan, Sar A. and Johnson, Clifford M. "The Future of Work: Does it Belong to Us or to the Robots?" *Monthly Labor Review,* September 1982, pp. 10–14.

The authors discuss the transformation of computer applications by microprocessors, the diffusion of robots and the diversity of robot applications, and they evaluate various estimates of job displacement effects.

9.119 Lieberman, Charles. "Structural and Technological Change in Money Demand." *American Economic Review,* May 1979, pp. 324–329.

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Suggests that technological change influences shifts in the demand for money and offers a model estimating the impact of such change.

9.120 Liebrenz, Marilyn L. *Transfer of Technology: U.S. Multinationals and Eastern Europe.* New York, Praeger, 1982. 363 pp.

Analyzes gains to U.S. firms from transferring technology. Describes corporate expectations and outcomes. Lists factors to be considered in technology transfer arrangements.

9.121 Linhart, Robert. *The Assembly Line.* Amherst, University of Massachusetts Press, 1981. 160 pp.

Describes the experience of working on an assembly line at a Citroen factory.

9.122 Long, Franklin A. and Oleson, Alexandria, eds. *Appropriate Technology and Social Values: A Critical Appraisal.* Cambridge, Mass., Ballinger, 1980. 215 pp.

A collection of essays dealing with the concept of appropriate technology, defined as small-scale, nonbureaucratic, promoting renewable resource use, and minimizing ecological impact and interdependence. Essays also deal with the historical origins of appropriate technology and the place of such technology in economic development.

9.123 Lund, Robert T. "Microprocessors and Productivity: Cashing in Our Chips." *Technology Review,* January 1981, pp. 32–36.

Traces the evolution of the microprocessor. Discusses applications, particularly in engineering design, servicing of machinery, operation of cranes, and sewing machines. Holds that lower unit labor requirements generated by microprocessors will be offset by employment gains from output increases.

9.124 Lynn, Leonard. "New Data on the Diffusion of the Basic Oxygen Furnace in the U.S. and Japan." *The Journal of Industrial Economics,* December 1981, pp. 123–136.

Presents disaggregated data showing that the Japanese were more aggressive in adopting new steelmaking technology than American steel producers.

9.125 Magat, W.A. "Technological Advance with Depletion of Innovation Possibilities—Implications for the Dynamics of Factor Shares." *Economic Journal,* September 1979, pp. 614–623.

Presents a model of induced technical change, where continued advances become increasingly difficult. Finds that with equal depletion elasticities for capital and labor, a falling capital-labor price ratio leads to an increase in labor's relative share in the national product.

9.126 Mansfield, Edwin. "Technology and Productivity in the United States." In *The American Economy in Transition.* Martin Feldstein, ed. Chicago, The University of Chicago Press, 1980, pp. 563–596.

Summarizes the data on productivity growth and the sources of growth. Discusses research and development and its impact on productivity. Examines patents as a measure of inventive activity and discusses public policies toward civilian technologies.

9.127 Mark, Jerome A. "Measuring the Effects of Technological Change." *Silicon, Satellites, and Robots.* Dennis Chamot and Joan M. Baggett, eds. Department for Professional Employees, AFL–CIO, September 1979, pp. 18–20.

Argues that it is difficult to isolate technological change from other factors affecting employment levels. Discusses industries in which employment changed but where productivity rose with either increases or decreases in employment, where productivity, however, rose. Presents a summary overview of pertinent BLS productivity studies.

9.128 Marovelli, Robert L. and Karhnak, John M. "The Mechanization of Mining." *Scientific American,* September 1982, pp. 91–113.

The authors discuss changes in labor productivity of coal and metallic mining, differentiating between deep and surface mining. They deal with various mining technologies, including the continuous mining machine and long-wall mining. They also discuss safety and health matters.

9.129 Martin, Gail M. "Industrial Robots Join the Workforce." *Occupational Outlook Quarterly,* Fall 1982, pp. 2–11.

Provides data on the number and types of industrial robots currently operating. Dis-

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cusses the current and likely prospective effect of robots upon the demand for labor. Also discusses occupational changes and training and retraining needs occasioned by robots.

9.130 Mayo, John S. "Evolution of the Intelligent Telecommunications Network." *Science*, February 12, 1982, pp. 831–837.

Surveys the development of telephony and the instruments that entered into it. Describes the impact of the transistor, the introduction of solid-state digital technology and its diffusion throughout the telecommunications system.

9.131 Mazuzan, George T. "Atomic Power Safety: The Case of the Power Reactor Development Company Fast Breeder, 1955–1956." *Technology and Culture*, July 1982, pp. 341–371.

Discusses one of the major conflicts that arose from the dual role of the original Atomic Energy Commission of encouraging private utility-operated nuclear power reactors, while regulating the safety and health aspects of atomic power.

9.132 McBain, N.S. and Uhlig, S.J. *Choice of Technique in Bolt and Nut Manufacture*. Edinburgh, Scottish Academic Press, 1982. 154 pp.

The authors identify the most efficient technologies under given economic conditions in the manufacture of steel nuts and bolts.

9.133 McCulloch, Rachel and Yellen, Janet. "Can Capital Movements Eliminate the Need for Technology Transfer?" *Journal of International Economics*, February 1982, pp. 95–106.

Analyzing welfare and efficiency implications of barriers to the international transfer of technology, the authors argue that the effects of such barriers depend on capital mobility.

9.134 Omitted.

9.135 "The Mechanization of Work." *Scientific American*, September 1982. Entire issue.

Presents articles on the mechanization of agriculture, mining, design and manufacturing, commerce, and office work. See also separate entries.

9.136 Meikle, Jeffrey L. *Twentieth Century Limited: Industrial Design in America, 1925–1939*. Philadelphia, Temple University Press, 1979. 249 pp.

Argues that many American designers aim at rebuilding the human environment. Traces the evolution of design from the Paris Exposition of 1925 to the New York World's Fair in 1939. Discusses the development of design from focusing on individual components to entire systems.

9.137 Meindl, James D. "Microelectronics and Computers in Medicine." *Science*, February 12, 1982, pp. 792–797.

Discusses the scope of computer applications, following the adoption of microelectronics in medical research, data collection, storage and retrieval, and decisionmaking. Examines such applications as computer tomography, clinical laboratory tests, and diagnostic tests.

9.138 Mendelssohn, Rudolph C. *Information Processing at BLS*. Report 583. Department of Labor, U.S. Bureau of Labor Statistics, 1980. Washington, U.S. Government Printing Office. 21 pp.

Describes the computer systems, hardware, and programs used by the BLS. Discusses applications in statistics and in word processing.

9.139 Mensch, Gerhard. *Stalemate in Technology: Innovations Overcome the Depression*. Cambridge, Mass., Ballinger Publishing Co., 1978. 241 pp.

Discusses the nature of technological stalemate, industrial evolution, and how new innovations emerge. Develops a model of long-term economic change based on industrial change and innovation.

9.140 Mettler, Ruben F. "Technology: A Powerful Agent for Change." In *The American Economy in Transition*, Martin Feldstein, ed. Chicago, The University of Chicago Press, pp. 596–604.

Discusses international constraints on the American economy, changes in military and energy technologies, and outlines features of a "second" industrial revolution.

9.141 Millard, Andre J. *The Diffusion of Electric Power Technology in England, 1880–1914*. Doctoral dissertation submitted to Emory University, 1981. 292 pp.

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Discusses the evolution of electric power in England in terms of its perceived lag behind Germany and the United States, particularly in high-voltage generation and urban traction systems. Shows that by 1914, English electrical engineering had surpassed that in all other countries, including the United States and Germany.

9.142 Miller, Hugh H. and Piekarz, Rolf R., eds. *Technology, International Economics, and Public Policy.* Boulder, Colo., Westview Press, 1982. 151 pp.

Research papers exploring the relation between technological innovation and foreign trade, focussing upon the United States and Sweden.

9.143 Mogee, Mary Ellen. "The Process of Technological Innovation in Industry: A State of Knowledge Review for Congress." In *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change.* Vol. 3. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 171–256.

Discusses the nature of innovation and factors affecting it. Also examines such factors as risk and uncertainty, industrial organization related to innovation, diffusion, and time lags.

9.144 Morrison, David L. and others. "Advances in Process Control." *Science.* February 12, 1982, pp. 813–818.

The authors describe improved technology including microcomputers and large-scale integrated electronics. They discuss the higher productivity of computers and their applications in the paper and pulp, petroleum and chemicals, and iron and steel industries.

9.145 Mueller, Willard F. and others. *Market Structure and Technological Performance in the Food Manufacturing Industries.* North Central Regional Research Publication 280. Madison, University of Wisconsin, College of Agricultural and Life Sciences, February 1982. 140 pp.

The authors examine the relation between inventive activity and industrial structure in the food industry. They also analyze the effect of R&D originating outside the food industry on productivity.

9.146 Mulligan, William H., Jr. "Mechanization and Work in the American Shoe Industry: Lynn, Massachusetts, 1852–1883." *The Journal of Economic History.* March 1981, pp. 59–64.

Discusses the transformation of shoe manufacture from small workshops to factories and the extensive division of labor that emerged.

9.147 Nair, K.N.S. *Technological Changes in Agriculture: Impact on Productivity and Employment.* New Delhi, Vision Books for Birla Institute of Scientific Research, 1980. 170 pp.

Investigates the pattern of technological change, land and labor productivity, and employment in 21 major countries, focussing on the 1960's and 1970's. Finds progress in food production outdistanced by population growth and irrigation, fertilizers, pesticides, and high-yielding seed varieties to have been the main bearers of technological advance.

9.148 Nelson, Richard. "Technical Advance and Economic Growth: Present Problems and Policy Issues." In *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change.* Vol. 3 Joint Economic Committee, U.S. Congress, December 1980. Washington, U.S. Government Printing Office, pp. 359–369.

Traces lagging economic growth to the increasing importance of the service sector, where productivity gains are slow. Advocates a stronger role for government to promote technological innovation, and to shield the process of innovation from economic fluctuations.

9.149 Newhouse, John. *The Sporty Game.* New York, Knopf, 1982. 242 pp.

Discusses developments in the commercial airline industry and the international challenge to American production of wide-bodied airliners.

9.150 Nora, Simon and Minc, Alain. *The Computerization of Society.* Cambridge, Mass., MIT Press, 1980. 186 pp.

The authors argue for French national control of the computer as a national resource to thwart control by multinational corporations. They hold that the telecommunications industry can be used as a base to control the com-

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puter market, and urge and development of public data networks to safeguard the public monopoly.

9.151 Norman, Colin. *Microelectronics at Work. Productivity and Jobs in the World Economy.* Washington, World Watch Institute, 1980. 63 pp.

Discusses such benefits as improved productivity in factories and offices and changes in communications technology. Examines employment losses; doubts that advances in microelectronics will coincide with high economic growth.

9.152 Oberai, A.S. and Singh, H.K.M. "Migration, Production, and Technology in Agriculture: A Case Study in the Indian Punjab." *International Labour Review*, May-June 1982, pp. 327-344.

The authors find that outmigration and loss of family labor do not adversely affect output, the introduction of new technology, or overall employment. They hold, instead, that migration brings about improvement in skills, implements, and technology.

9.153 Organization for Economic Cooperation and Development. *Technical Change and Economic Policy.* Paris, 1980. 117 pp.

Discusses the changing context of technological and science policy. Analyzes recent trends in R&D activities and in patterns of innovation. Examines the relation of productivity and technical change to inflation and employment.

9.154. Osteryoung, Janet. "Developments in Electrochemical Instrumentation." *Science*, October 15, 1982, pp. 261-265.

Discusses the diffusion of electrochemistry beyond the purview of professional electrochemists. Explores problem of linking new electrochemical instruments to computers and argues that improvements depend largely on electrode materials.

9.155 Ozawa, Terutomo. "Government Control over Technology Acquisition and Firms' Entry into New Sectors: The Experience of Japan's Synthetic Fiber Industry." *Cambridge Journal of Economics*, June 1980, pp. 133-146.

Reports on Japan's "staggered entry" policy, showing how it accounted for the swift development of the synthetic fiber industry. Argues that new entries into the industry could not be prevented, resulting in overcapacity and intensifying pressures to export.

9.156 Pavitt, Keith, ed. *Technical Innovation and British Economic Performance.* London, Macmillan, 1980. 353 pp.

A collection of papers discussing reasons for British "innovative backwardness," international comparisons of innovation, performance of such industries as textiles, coal, and semiconductors, the nature, rate, and direction of technical innovation, and policy implications.

9.157 Peitchinis, Stephen G. *The Attitude of Trade Unions Towards Technological Changes.* Calgary, The University of Calgary, April 1980. 73 pp.

Finds that trade unions have little say about the introduction of new technology, have failed to provide their members with job security to guard against job loss because of it, and in general, do not oppose technological change or bargain about it.

9.158 Perlmutter, Howard V. and Sagafi-Nejad, Tagi. *International Technology Transfer: Guidelines, Codes, and a Muffled Quadrilogue.* New York, Pergamon Press, 1981. 235 pp.

The authors call for mandatory codes of conduct for international technology transfer to accelerate closing of the technology gap between advanced and developing countries. They analyze the views of various supplier countries, as well as of receiving countries.

9.159 Peterson, Willis and Kislev, Yoav. *The Cotton Harvester in Retrospect: Labor Displacement or Replacement?* Staff Paper P81-25. St. Paul, University of Minnesota Institute of Agriculture, Forestry and Home Economics. September 1981. 15 pp.

Testing the hypothesis that increased real nonfarm wages, rather than the introduction of the cotton harvester, caused labor to leave Southern agriculture, the authors conclude that the data confirm their hypothesis.

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9.160 Phillips, Vivian J. *Early Radio Wave Detectors.* London, Peter Peregrinus, 1980. 223 pp.

Discusses the problems encountered in the detection and amplification of radio waves. Describes wave detector devices, and traces the evolution of the vacuum tube, transmitter, and receiver.

9.161 Pitzer, John S. *An Analysis of Technical Change in the Soviet Economy: An Application of Soviet Input-Output Tables.* Doctoral dissertation presented to the American University, 1980. 392 pp.

Tests the feasibility of updating Soviet input-output tables, which exist only for 1959, 1966, and 1972. Interpolates for the intervening years. Attempts to estimate changes in the efficiency in the use of fossil fuels from the updated tables. Finds no response to higher world fuel prices in the Soviet Union, owing to large increases in fuel used per unit of agricultural output.

9.162 Pursell, Carroll W., ed. *Technology in America: A History of Individuals and Ideas.* Cambridge, Mass. MIT Press, 1981. 264 pp.

A collection of essays covering such subjects as the evolution of technical education, technology and democracy, the invention of the telephone and Alexander Graham Bell, the conservation movement and Gifford Pinchot, the manufacturing system and Eli Whitney, and the role of the engineer in entrepreneurship.

9.163 Puu, Toeni and Wibe, Soeren. *The Economics of Technological Progress.* Proceedings of a conference held by the European Production Study Group at Umea, Sweden, 23–25 August, 1978. New York, St. Martin's Press, 1980. 336 pp.

Research papers on technological progress, technology, and industrial and employment policy.

9.164 Rada, J. *The Impact of Micro-Electronics: A Tentative Appraisal of Information Technology.* Geneva, International Labour Office, 1980. 109 pp.

Discusses the nature and characteristics of the new information technology, its applications in services and manufacturing. Also discusses its diffusion and its likely effects in developing countries.

9.165 Raffaele, Joseph A. *The Management of Technology. Change in a Society of Organized Advocacies.* Washington, University of America Press, 1979. 346 pp.

Examines linkages between technology, values, organization, and social processes. Discusses the relationship of technology to engineering and science. Also discusses the role of government in R & D and technological change.

9.166 Ramesh, Jairam and Weiss, Charles, Jr., ed. *Mobilizing Technology for World Development.* New York, Praeger, 1979. 234 pp.

A collection of essays on appropriate technology for developing countries, transnational enterprise and technology flows, the experience of individual countries having advanced technologies, and the management of global problems by means of technology.

9.167 Ramo, Simon. *America's Technology Slip.* New York, John Wiley, 1980. 297 pp.

After listing the evidence for lagging technological growth in the U.S., the author discusses the retrogressive effects of taxation, regulation, anti-trust, and technology transfer. Discusses the adversarial relation between government and the private sector, and recommends a restructuring of the relation.

9.168 Rasmussen, Wayne D. "The Mechanization of Agriculture." *Scientific American.* September 1982, pp. 77–89.

Traces mechanization of agriculture in the United States. Discusses the introduction of steam-driven equipment, chemical fertilizers, new types of seed, irrigation, the application of technology to animal husbandry, and agricultural productivity.

9.169 Rescher, Nicholas. *Unpopular Essays on Technological Progress.* Pittsburgh, University of Pittsburgh Press, 1980. 122 pp.

Discusses the economic and social ramification of technological progress, including such topics as "big science," lifesaving techniques in medicine, and others.

9.170 Resnikoff, Howard L. and Weiss, Edward C. "Adapting Use of Information and Knowledge to Enhance Productivity: Productivity, Information, and Energy." In *Dimensions of Productivity Research. Proceedings of*

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the Conference on Productivity Research. The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 507–549.

The authors discuss the emergence of information technology, analyzing its four conceptual parts: Input/output devices, storage mechanisms, information processing and analysis capability, and telecommunications. They also discuss declining costs of such technology and seek to resolve the conflict between advances in information technology and declines in office worker productivity

9.171 Robinson, Austin, ed. *Appropriate Technologies for Third World Development.* Proceedings of a conference held by the International Economic Association at Teheran. New York, St. Martin's Press, 1979. 417 pp.

Essays focussing on reasons why developing countries have failed to institute appropriate technologies. Among topics discussed are the use of technologies in China, Japan, Turkey, and Iran and the employment effects of appropriate technologies.

9.172 Rogers, Kenneth C. "Engineering Enters New Cycle of Development and Definition." *Science,* July 4, 1980, pp. 127–132.

Discusses the effect of the microprocessor and computer on manufacturing design and processes and the growing autonomy of engineers. Urges that engineering schools stress technical as well as societal leadership.

9.173 Roldan, Romualdo A. *The Technology of Multinational Corporations: A Statistical Analysis of Their Factor Intensities.* Doctoral dissertation presented to the University of Pennsylvania, 1978. 205 pp.

Analyzes the use of multinational corporation technology in terms of production functions, with differences in capital-labor ratios explained by differences in factor prices and technology. Finds capital-labor ratios to be higher for affiliates operating in developed than in developing countries, and that the differences can be explained by factor substitution effects.

9.174 Roman, Zoltan., ed. *Industrial Development and Industrial Policy. Proceedings of the Second International Conference on Industrial Economics,* Szekesfehervar, Hungary. Philadelphia, Heyden, 1979. 476 pp.

A collection of papers evaluating technological progress and structural transformation in industrial production, the diffusion of technology, employment and productivity, investment, and the international division of labor.

9.175 Rosegger, G. "Diffusion and Technological Specificity: The Case of Continuous Casting." *Journal of Industrial Economics,* September 1979, pp. 39–53.

Argues that technology embodied in existing facilities, degree of vertical integration, size of plants, output mix, and other factors determine which plants are most likely to adopt the new casting process. Presents diffusion patterns for segments of U.S. iron and steel industry, 1963–1975.

9.176 Rosenblatt, Samuel M., ed. *Technology and Economic Development: A Realistic Perspective.* Boulder, Colo., Westview Press, 1979. 191 pp.

A collection of papers on topics such as the limited role of technology in economic development, the responsibility of developing countries for adapting to new technologies, the frequent appropriateness of the latest technology in the development process, and the transnational firm as a necessary link in transferring technology.

9.177 Rotella, Elyce. "The Transformation of the American Office: Changes in Employment and Technology." *The Journal of Economic History,* March 1981, pp. 51–57.

Explores the relation between changes in office technology and employment. Discusses and analyzes sex composition of clerical employment, linking it to the adoption of new techniques.

9.178 Rubenstein, Albert H. "The Role of Embedded Technology in the Industrial Innovation Process." In *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change,* Vol. 3. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 380–414.

Defines the concept of embedded technology and discusses its role in the economy, as well as the indicators to measure and monitor it. Proposes policies and further analysis.

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9.179 Russell, Louise B. *Technology in Hospitals: Medical Advances and Their Diffusion.* Washington, Brookings, 1979. 180 pp.

Presents case studies of intensive care, respiratory therapy, diagnostic radioisotopes, open heart surgery, and other advances. Examines the kinds and amounts of resources required and the benefits to patients. Surveys policies affecting medical technologies in the United States and some other countries.

9.180 Sahal, Devendra. *Patterns of Technological Innovation.* Don Mills, Ont., Addision-Wesley, 1981. 381 pp.

Explains certain regularities in the origin, diffusion, and development of new technologies. Argues that key determinants of technical progress include a cumulative learning process leading to a flow of innovations and changes in scale requiring qualitative changes in technology.

9.181 Sahal, Devendra, ed. *The Transfer and Utilization of Technical Knowledge.* Lexington, Mass., Heath, 1982. 271 pp.

A collection of papers discussing technological flows across firms and industries, and examining how decisions are made that affect technology transfers.

9.182 Schacht, Wendy H. "The Role of Small-Scale Technology in Innovation." In *Research and Innovation: Developing a Dynamic Nation. Special Study* on *Economic Change,* Vol. 3. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 429–435.

Argues that minor technological improvements foster self-reliance and decentralization, and meet the need for understandable technologies over which the individual can exercise control.

9.183 Schuurman, Egbert. *Technology and the Future: A Philosophical Challenge.* Toronto Wedge Publishing Foundation, 1980. 434 pp.

Surveys the contributions of the more prominent students of technology. Classifies them in philosophical terms. Essentially rejects their "secular" orientation.

9.184 Science Council of Canada. *The Adoption of Foreign Technology by Canadian Industry.* Ottawa, Science Council of Canada, 1981. 152 pp.

A collection of studies examining aspects of technology acquisition in Canada. Papers deal with technology transfer by multinationals and the experience of firms of varying size.

9.185 Science Council of Canada. *Hard Times, Hard Choices: Technology and the Balance of Payments.* Ottawa, 1981. 99 pp.

Analyzes the deterioration in the international trade of high-technology industries, particularly research-intensive industries. Advocates policies for sustained growth of Canadian-owned companies.

9.186 Scott, Joan Wallach. "The M :hanization of Women's Work." *Scientific American,* September 1982, pp. 167–187.

Argues that women's social position has not been fundamentally affected by the mechanization of the work. Discusses wage differentials based on sex and notes increases in time spent on household work.

9.187 Semiatin, S.L. and Lahotti, G.D. "The Forging of Metals." *Scientific American,* August 1981, pp. 98–106.

After describing the history of metals forging, the authors discuss the progress of knowledge of the deformation of metals and the application of computers to the forging process.

9.188 Sen, Asim. *The Role of Technological Change in Economic Development: The Lessons of Japan for Presently Developing Countries.* Doctoral dissertation presented to Rutgers University, The State University of New Jersey, 1979. 357 pp.

Deals with Japanese technological development from preindustrial to modern times. Argues that the Japanese experience points to large labor resources and labor-intensive technologies as major advantages for a developing economy.

9.189 Shaiken, Harley. "Microprocessors and Labor: Whose Bargaining Chips?" *Technology Review,* January 1981, p. 37.

Discusses the impact of mircoprocessors on products, production processes, and jobs.

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9.190 Sheppard, Steward C. and Carroll, Donald C., ed. *Working in the 21st Century.* New York, John Wiley, 1980. 235 pp.

A collection of essays on such themes as the effect of natural resources, capital, and technology on work; the boom in communications; the implications of the evolution of the biosciences and information sciences; the relation of technology and society; and jobs in services.

9.191 Siggel, Eckhard. *Technology Transfer and the Choice of Industrial Technologies in a Developing Country: The Case of Zaire.* Doctoral dissertation presented to the University of Toronto, 1978. No pp. indicated.

Identifies social cost-benefit analysis as the most comprehensive method of evaluating appropriate and intermediate technologies for developing countries. Investigates problems of the transfer of tachnologies from industrial to developing countries. Emphasizes skill training.

9.192 Sommers, Paul E. *The Diffusion of Nuclear Power Generation in the United States.* Doctoral dissertation presented to Yale University, 1978. 218 pp.

Shows that uncertainties about the characteristics of nuclear power generating innovations have lasted well into the diffusion process, contrary to conventional assumptions about this process. Analyzes the sources and effects of regulation and how regulation has delayed plant completion. Examines the determinants of electrical output of nuclear power plants.

9.193 "The Speedup in Automation." *Business Week,* August 3, 1981, pp. 58–67.

Discusses the likely acceleration of computer-aided design and, subsequently, computer-aided manufacturing. Expects these production methods to be increasingly applied to small or medium-sized runs. Examines the impact of these methods on the factory work force, in terms of disemployment and training needs.

9.194 Spinrad, R.J. "Office Automation." *Science,* February 12, 1982, pp. 808–813.

Discusses the significance of the shift from conventional paperwork to automated equipment in the office. Describes various systems and the evolution of their capabilities and cost.

9.195 Stern, Nancy. "The Eckert-Mauchly Computers: Conceptual Triumphs, Commercial Tribulations." *Technology and Culture,* October 1982, pp. 569–582.

Examines the inventions and commercial activities of two of the inventors of the computers. Deals with their relations with government agencies, and congressional resistance to adoption of their computer designs.

9.196 Stern, Nancy. *From ENIAC to UNIVAC: An Appraisal of the Eckert-Mauchly Computers.* Bedford, Mass., Digital Press, 1981. 286 pp.

Explores reasons why the computer moved from military and academic laboratories to its present position in society at large. Recounts the history of computer invention, stressing the role of certain inventors.

9.197 Street, James H. and James, Dilmus D., eds. *Technological Progress in Latin America: The Prospects for Overcoming Dependency.* Boulder, Colo., Westview Press, 1979. 257 pp.

A collection of paper appraising the nature of technological dependency, the possibilities for indigenous R&D, and the course of successful internal technological diffusion.

9.198 Sumrall, James B. Jr. "Diffusion of the Basic Oxygen Furnace in the U.S. Steel Industry." *The Journal of Industrial Economics,* June 1982, pp. 421–438.

After surveying the period over which the basic oxygen process was introduced, the author finds that its diffusion was slower than might have been expected.

9.199 Swaminathan, M.S. "Biotechnology Research and Third World Agriculture." *Science,* December 3, 1982, pp. 967–972.

Discusses the priorities of biotechnology research in various countries and the relation of biotechnology to raising crop yields. Discusses its application to rice production and analyzes current usage.

9.200 Sveikauskas, Leo. "Technological Inputs and Multifactor Productivity Growth." *The Review of Economics and Statistics,* May 1981, pp. 275–282.

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Examines the relation between productivity growth and knowledge inputs. Also investigates the impact of technological imputs purchased indirectly through capital investment.

9.201 Tann, J. and Brecklin, M.J. "The International Diffusion of the Watt Engine, 1775–1825." *Economic History Review*, November 1978, pp. 541–564.

Using a model of the stages of diffusion, the authors test empirical data from records of Boulton and Watt. They link those stages to the diffusion of the Newcomen engine and identify adoption processes.

9.202 Thomas, Hugh. *A History of the World.* New York, Harper & Row, 1979. 700 pp.

Divides world history into agricultural and industrial eras, stressing technological change and innovation. Argues that technological advance presupposes freedom to experiment and to use new techniques, and any decline in such freedom will cause technology and human welfare to decline.

9.203 Thompson III, Alexander Mackenzie. *Technology, Labor, and Industrial Structure of the U.S. Coal Industry: A Historical Perspective.* New York, Garland, 1979. 431 pp.

Investigates the historical relationship between capital accumulation and the extraction of coal. Analyzes technological change, productivity growth, and labor displacement.

9.204 Thrall, Charles A. "The Conservative Use of Modern Household Technology." *Technology and Culture*, April 1982, pp. 175–194.

Argues that modern household equipment exemplifies technology that supports and reinforces existing social arrangements. Examines the relation between the use of household equipment, the time it saves relative to not using it, and its effects on the division of labor within the family.

9.205 Travers, Sumter L. *Choice of Technique and Agricultural Modernization in China.* Doctoral dissertation presented to the University of California, Berkeley, 1979. 235 pp.

Examines the choice of technique theory in light of high rates of capital accumulation in Chinese agriculture. Finds that Chinese agriculture makes a net contribution to resources of investment in other economic sectors. Also examines the accumulation mechanism within communes, finding that commune and brigade-level enterprise promotes a strategy of rural capital accumulation.

9.206 Tunzelmann von, G.N. *Steam Power and British Industrialization to 1860.* Oxford, Oxford University Press, 1978. 344 pp.

Argues that the role of steam power in industrializing England has been overrated. Bases the argument on a model of diffusion and applications to the cotton, textile, and mining industries. Offers international comparisons.

9.207 United Nations Industrial Development Organization. *Appropriate Industrial Technology for Construction and Building Materials.* New York, United Nations, 1980. 218 pp.

A collection of research papers focusing on topics related to construction and building materials. Presents studies of rural areas in India, Indonesia, Iran, and other countries.

9.208 United Nations Industrial Development Organization. *Appropriate Industrial Technology for Drugs and Pharmaceuticals.* New York, United Nations, 1980. 140 pp.

A collection of papers discussing technological aspects of producing and distributing drugs and pharmaceuticals in less developed countries.

9.209 U.S. General Accounting Office. *Better Management Needed in Automating the Federal Judiciary.* Washington, April 12, 1981. 41 pp.

Discusses software systems used by the Federal Judicial Center's computer-based systems in supporting Federal court activities and certain problems arising from lack of coordination.

9.210 U.S. General Accounting Office. *Follow on Use of Numerically Controlled Equipment to Improve Defense Plant Productivity.* Washington, January 17, 1979. 63 pp.

Reviewing earlier reports on the subject, the authors examine how pertinent recommendations were implemented. They hold that standardization remains a problem, management information systems continue to be too diverse for efficient application, utilization is suboptimal because of inadequate work inter-

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change, and systems for workloading parts onto machines require improvement.

9.211 Vacca, Roberto. *Modest Technologies for a Complicated World.* New York, Pergamon Press, 1980. 172 pp.

Inquiries into the conditions needed in developing countries to introduce new "modest" technologies. Argues that both intermediate or alternative technologies are required. Believes that the problem is to find the right mix of the two sets of technology.

9.212 Valdes, Alberto and others. *Economics and the Design of Small Farmer Technology.* Ames, Iowa State University Press, 1979. 211 pp.

Research papers examining, some in the form of case studies, the nature of rural development programs, farmers' attitudes, cattle production, and implications for technology design.

9.213 Vedder, Richard K. *Robotics and the Economy.* A staff study of the Joint Economic Committee, U.S. Congress. Washington, U.S. Government Printing Office, 1982. 34 pp.

Takes issue with the argument that robots are fundamentally destructive of jobs. Presents estimates of jobs robots are expected to perform, and discusses overall employment effects.

9.214 Wallender, Harvey W. III. *Technology Transfer and Management in the Developing Countries: Company Cases and Policy Analyses in Brazil, Kenya, Korea, Peru and Tanzania.* Cambridge, Mass., Harper & Row, Ballinger, 1979. 295 pp.

Discusses problems involving the search for and use of foreign technologies by user firms in developing countries. Reviews prevailing theories on technology transfer. Examines pertinent management behavior.

9.215 Wattleworth, Michael A. *Diffusion of Technology in Malaysia's Rubber Estate Sector.* Doctoral dissertation submitted to the University of California, Berkeley, 1980. 338 pp.

Modifies the conventional diffusion model. Analyzes diffusion of technology in Malaysian rubber production in detail, noting its relation to competition from synthetic rubber. Discusses the replacement of older, unselected rubber trees by high-yielding clones, developed locally. Also examines diversification into oil palm.

9.216 Whitted, Turner. "Some Recent Advances in Computer Graphics." *Science,* February 12, 1982, pp. 766–774.

Discusses advances in quality and display hardware and underlying technologies. Examines applications in computer-aided design, plotting of scientific computations, flight training, and communications.

9.217 Willems, Philippus. *Economic and Noneconomic Factors in the Diffusion of Technology. Maine Dairy Farms, 1964–1974.* Doctoral dissertation presented to the University of Maryland, 1980. 183 pp.

Examines social and economic aspects of technological change among farmers. Finds that farmers adopting the most innovations are generally those with the larger herds, more debt per cow, less tillable acreage per cow, fewer man-hours of labor per cow, and more contact with extension workers. Argues the close relationship between technological change and decline in the number of farms and increase in size of herds.

9.218 Williams, Trevor I., ed. *A History of Technology: The Twentieth Century, c. 1900 to c. 1950.* Vols. 6 and 7. Oxford University Press, 1978. 1,530 pp.

A collection of research papers covering the social setting of technology and technological developments in various industries and in town planning.

9.219 Wills, J. "Technical Change in the U.S. Primary Metals Industry." *Journal of Econometrics,* April 1979, pp. 85–98.

Presents estimates of cost functions embodying biased technical change for the post-World War II period.

9.220 Young, Darrel A. *Men Versus Machines: A Study of Choice of Technology in Andean Metalworking Firms.* Doctoral dissertation presented to the University of Texas at Austin, 1979. 322 pp.

Examines the influence of distorted factor costs on the choice of capital-intensive technology in labor-abundant countries. Investigates the effects of labor disputes, intensity of

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competition, lack of the technological alternatives, and other factors.

9.221 Zaleski, Eugene and Wienert, Helgard. *Technology Transfer Between East and West.* Paris, Organization for Economic Cooperation and Development, 1980. 435 pp.

The authors review the pertinent literature, and attempt to quantify East-West technology flows. Find these flows to occur mainly from West to East, with the gap widening in recent years.

9.222 Zarbafian, Shamseddin. *Technology Transfer and Economic Development in Iran, 1962–77.* Doctoral dissertation presented to Colorado State University, 1979. 171 pp.

Analyzes the impact of imported technology on Iran's industrial productivity. Examines the industry sources of technology, interfirm efficiency, and national science policy. Finds high economic growth during the period considered, as well as a shift from agriculture to industry. Also finds high rate of labor productivity advance, of which 40 percent was associated with technical change.

9.223 Zimbalist, Andrew, ed. *Case Studies on the Labor Process.* New York, Monthly Press, 1979. 314 pp.

Features essays on the industrialization of computer programming; social choices underlying automatically controlled machine tools; trends in the design of clerical work, carpentry, and coal mining; origins of the assembly line; and related topics.

Research and development; innovation

10.1 Amann, Ronald and Cooper, Julian, eds. *Industrial Innovation in the Soviet Union.* New Haven, Yale University Press, 1982. 526 pp.

A collection of papers dealing with innovation in the machine tool and chemical industries, group technology at the plant level, management automation programs, control instrumentation, the role of foreign technologies, and other topics.

10.2 *An Age of Innovation: The World of Electronics.* By the editors of *Electronics.* New York, McGraw-Hill, 1980. 274 pp.

The authors recount, decade by decade, the evolution of the major electronic devices, the concepts underlying them, their applications, and the social and political context in which they were developed.

10.3 Beggs, John. *Long-Run Trends in Patenting.* Working Paper No. 952. Cambridge, Mass., National Bureau of Economic Research, August 1982.

Links rates of change in patenting between 1790 and 1980 to "defensive" R&D by industries under competitive pressures. Holds that much patenting is to protect existing capital stock by upgrading and by improving final products.

10.4 Behrman, Jack N. and Fischer, William A. *Overseas R&D Activities of Transnational Companies.* Cambridge, Mass, Oelgeschlager, Gunn & Hain, 1980. 344 pp.

The authors present case studies of R&D activities of large transnational firms and, based on interviews at these firms, discuss choice of location, R & D management, invention and innovating, diffusion of R&D related capabilities, and other subjects.

10.5 Berlowitz, Laurence et al. "Instrumentation Needs of Research Universities." *Science,* March 6, 1981, pp. 1013–1018.

Chiefly because of relative declines in funding, the authors find that university instrumentation has seriously deteriorated.

10.6 Bloom, Justin L. and Asano, Shinsuke, "Tsukuba Science City: Japan Tries Planned Innovation." *Science,* June 12, 1981, pp. 1239–1247.

The authors describe the history and purpose of Tsukuba and list research institutes located there. They analyze the relation between scientific research and government policy as exemplified by the city.

10.7 Boesman, William. "Science and Technology Outlook Related to Economic Change." In *Research and Innovation: Developing a Dynamic Nation. Study on Economic Change,* Vol. 3. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 447–521.

Discusses the interrelationship of research and innovation. Subjects include research, government support of science, innovation,

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commercialization, political aspects, and international linkages.

10.8 Bredahl, Maury and others. "Behavior and Productivity Implications of Institutional and Project Funding of Research." *American Journal of Agricultural Economics*. August 1980, pp. 371-383.

The authors discuss funding of institutional and project research, recommending that national research policy should be cast in terms of a mix of the two types.

10.9 Bromley, Allan D. "The Other Frontiers of Science." *Science*. February 26, 1982, pp. 1035-1044.

Discusses the position and problems of science in its encounter with the world external to it, including the Federal Government, the educational establishment, the private sector, national security and defense, and the developing world.

10.10 Bull, Alan T. and others. *Biotechnology. International Trends and Perspectives*. Paris, Organization for Economic Cooperation and Development, 1982. 84 pp.

The authors consider biotechnology research prospects, constraints which may hinder its development, and government policy.

10.11 Burnstal, M. L. and others. *Multinational Enterprises, Governments and Technology: Study of the Impact of Multinational Enterprises and National Scientific and Technical Capacities in the Pharmaceutical Industry*. Paris, OECD, 1981. 252 pp.

The authors examine innovation in multinational pharmaceutical enterprises, the creation of scientific and technical knowledge, and impacts on OECD member nations. They find no direct relation between multinational penetration and national capacities.

10.12 Busch, Lawrence, ed. *Science and Agricultural Development*. Totowa, N.J., Allanheld Osmun, 1981. 188 pp.

A collection of research papers discussing the relation between the agricultural sciences, capitalism, and the state. Topics include the evolution of agricultural technology, export of agricultural research to developing countries, and the evolution of agriculture in the United States.

10.13 Carmichael, Jeffrey. "The Effects of Mission-Oriented Public R&D Spending on Private Industry." *Journal of Finance*. June 1981, pp. 617-627.

Finds that government funding of R&D accounts for 92 cents of each dollar of funding, citing evidence from the transportation industry.

10.14 Carter, Charles, ed. *Industrial Policy and Innovation*. London, Heinemann, 1981. 241 pp.

A collection of research papers, discussing the rationale for government intervention in promoting innovation, British and Japanese experience, industrial policies towards microelectronics and other topics.

10.15 Chirichiello, John and Crowley, Michael. *National Patterns of Science and Technology Resources, 1980*. National Science Foundation. Washington, U.S. Government Printing Office, March 1980, 73 pp.

The authors analyze the sources of financial support for research and development, employment opportunities and labor market dynamics for science and engineering personnel. They also relate R&D resources to the national economy.

10.16 Clark, Kim B. and Griliches, Zvi. *Productivity Growth and R&D at the Business Level: Results from the PIMS Data Base*. Working Paper No. 916. Cambridge, Mass., National Bureau of Economic Research, 1982.

Using data from the Profit Impact of Marketing Strategy (PIMS) project, the authors find that when narrowly defined business units are examined, the productivity returns from R&D did not drop in the 1970's, as widely believed, but remained at earlier levels.

10.17 Cochran, Thomas C. *Frontiers of Change. Early Industrialization in America*. New York, Oxford University Press, 1981. 179 pp.

Holds that the cultural interest in innovation of American artisans and mechanics, combined with a favorable physical environment, to be the chief source of American industrialization. Disputes the thesis that labor

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scarcity made for the innovation of labor-saving machinery.

10.18 Collins, Eileen L. "Tax Incentives for Innovation—Productivity Miracle or Media Hype?" *Journal of Post-Keynesian Economics*, Fall 1981, pp. 68–74.

Shows that there are positive effects of tax incentives on innovation, but finds that the size of the effects is unknown, and that the success of the incentives hinges on market conditions and business confidence.

10.19 Omitted

10.20 Dasgupta, P. and Stiglitz, J. "Industrial Structure and the Nature of Innovative Activity." *Economic Journal*, June 1980, pp. 266–293.

The authors develop a number of econometric models in order to explore views expressed by Schumpeter, Arrow, and Kalecki, and also to explain certain empirical findings on R&D found in the literature.

10.21 David, Edward E. Jr. "Industrial Research in America: Challenge of a New Synthesis." *Science*, July 4, 1980, pp. 133–139.

Traces historical aspects of industrial research, emphasizing the split between academic and industrial research. Discusses the role of government in research since World War II and its impact on industry.

10.22 Davies, Stephen. *The Diffusion of Process Innovations*. New York, Cambridge University Press, 1979, 193 pp.

Investigates the forces underlying the spread of new production processes using data from 22 innovations adopted by British industry since World War II. Examines the relation between industrial structure and the speed of diffusion, finding that speed depends on such factors as profitability, number of firms in an industry, labor intensity, and rate of growth.

10.23 Dean, Burton V. and Goldhar, Joel L., eds. *Management of Research and Innovation*. New York, North Holland, 1980. 300 pp.

A collection of research papers dealing with topics such as the process of generating ideas, technology forecasting; evaluating R&D projects; and R&D issues in the public sector.

10.24 DeBrock, Lawrence M. *Inventive Rivalry, and Social Efficiency*. Doctoral dissertation presented to Cornell University, 1980. 105 pp.

Examines patent law as one of several social control mechanism. Discusses optimal patent life under different degrees of competition in the market for inventions. Investigates the timing of innovations under conditions of growing technological opportunities. Assays monopolistic vs. competitive market structures in the context of innovation markets.

10.25 Feller, Irwin. "Science and Technology in State and Local Governments: Problems and Opportunities." In *The Five-Year Outlook. Problems, Opportunities, and Constraints in Science and Technology*. Vol. II. National Science Foundation. Washington, U.S. Government Printing Office, 1980, pp. 639–648.

Explores the uses of scientific and technological knowledge by state and local bodies, and relations with Federal agencies. Assesses pertinent Federal efforts.

10.26 Ferguson, Eugene S. *Oliver Evans, Inventive Genius of the American Industrial Revolution*. Wilmington, Del., Hagley Museum, 1980. 72 pp.

Decribes the origin of the automatic mill and high-pressure steam engine invented by Evans. Discusses Evans' views of the social institutions needed to spur technological progress.

10.27 Fixler, Dennis J. *The Incentive to Invent*. Doctoral dissertation presented to Purdue University, 1978. 172 pp.

Examines the relation between market structure and invention and between learning by doing and capital accumulation.

10.28 Fox, Robert and Weisz, George, eds. *The Organization of Science and Technology in France, 1808–1914*. New York, Cambridge University Press, 1980. 341 pp.

A collection of essays showing that French science and technology were not as inadequately organized as has been commonly assumed. Among subjects discussed are the rise of polytechnic schools, and German rivalry as a spur to improvements in the teaching of science and technology.

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10.29 Fusfeld, Herbert I. and Haklisch, Carmelia S., eds. "Science and Technology Policy: Perspectives for the 1980's," *Annals of the New York Academy of Sciences.* New York, The New York Academy of Sciences, 1979. 285 pp.

Papers discuss such subjects as the relation of technical advance and economic growth; policy in such fields as food and nutrition, materials, and energy; and the interaction of science and technology policy with regulation, foreign policy, and society at large.

10.30 Fusfeld, Herbert I. and Langlois, Richard N., eds. *Understanding R&D Productivity.* New York, Pergamon Press, 1982. 150 pp.

A collection of papers discussing such topics as measurement of R&D productivity, its relation to economic growth, and impact of R&D investment on the semiconductor industry.

10.31 Gallini, Nancy T. *Research and Development of an Exhaustible Resource Substitute: The Case of Synthetic Oil.* Doctoral dissertation submitted to the University of California, Berkeley, 1980. 202 pp.

Examines the production potential of coal-derived synthetic oil for satisfying petroleum demand in the United States. Develops a method for determining a R&D portfolio of coal liquids technologies.

10.32 Gambino, Anthony J. and Gartenberg, Morris. *Industrial R&D Management.* New York, National Association of Accountants, 1979. 134 pp.

The authors examine R&D budgeting, scheduling, evaluation, and related subjects. They discuss ways of improving the R&D effort, including the use of quantitative methods, such as network techniques.

10.33 Geissbuehler, Hans, and others. "Frontiers in Crop Production: Chemical Research Objectives." *Science.* August 6, 1982, pp. 505–510.

Discussing constraints on the role of chemistry in future crop production, the authors deal with the worldwide eco-biological system; advances in biological science offering alternative or complementary solutions, and increases in the agricultural productivity of developing countries where the use of chemicals is required.

10.34 Gerstenfeld, Arthur, ed. *Technological Innovation. Government/Industry Cooperation* New York, Wiley, 1979. 277 pp.

A collection of research papers covering economic and social aspects of innovation and the role of industry and government. Papers also deal with topics such as the management of technology, regulatory codes ensuring social advancement, and government procurement to upgrade industry's technical levels.

10.35 Gillispie, Charles Coulston. *Science and Policy in France at the End of the Old Regime.* Princeton, Princeton University Press, 1981. 602 pp.

Analyzes the growth of scientific institutions in late 18th century France and their relation to the state. Explores the attempt to sustain the state's power by enhancing the powers of science and applications of science to agriculture and industry.

10.36 Gold, Bela and others. *Evaluating Technological Innovations: Methods, Expectations, and Findings.* Lexington, Mass., Heath, 1980. 358 pp.

The authors analyze the technological capabilities of the U.S. steel industry, reviewing the literature on diffusion and on the models used to evaluate prospective innovations. Among their findings is that innovations do not have a general tendency to raise profits.

10.37 Gort, Michael and Klepper, Steven. "Time Paths in the Diffusion of Product Innovations." *Economic Journal,* September 1982, pp. 630–653.

The authors examine the development and diffusion of 46 new products and test various diffusion theories against their empirical findings.

10.38 Griliches, Zvi. "R&D and the Productivity Slowdown." *American Economic Review,* May 1980, pp. 343–348.

Inquires into the mechanism by which lagging R&D might have contributed to the productivity slowdown. Also deals with the nature and scope of the slowdown, and trends in R&D.

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10.39 Griliches, Zvi and Lichtenberg, Frank. *R and D and Productivity at the Industry Level: Is There Still a Relationship?* Working Paper No. 850. Cambridge, Mass., National Bureau of Economic Research, 1982.

The authors find a strong relation between R&D and total factor productivity at the industry level, and less deceleration of productivity in R&D-intensive industries than among others. They find no strong slowdown in R&D spending.

10.40 Griliches, Zvi and Mairesse, Jacques. *Productivity and R and D at the Firm Level.* Working Paper No. 826. Cambridge, Mass., National Bureau of Economic Research, Dec. 1981.

The authors analyze the interrelationship of output, employment, physical capital, and R&D capital in a sample of large firms, 1966–77. They find a strong relationship between firm productivity and level of R&D investment.

10.41 Heaton, George, and others. *Indirect Mechanisms of Federal Support of Research and Development.* Vol. II. *Administrative Responsibilities and the Conduct of Academic Basic Research.* Vol. III. Papers Commissioned as Background for *Science Indicators—1980.* Washington, National Science Foundation, 1980. Various pagination.

Contains papers on technological innovation and tax policy, indirect support for programs of R&D, and technology innovation, Federal funding of basic research, and other topics.

10.42 Hechler, Ken. *Toward the Endless Frontier: History of the Committee of Science and Technology, 1959–79.* Washington, U.S. Government Printing Office, 1980. 1,072 pp.

Traces the legislative initiatives of the Committee in the research and development areas of the "hard" sciences and engineering. Recounts the evolution of congressional authority over national science in competition with the executive branch.

10.43 Hewitt, Gary. "Research and Development Performed Abroad by U.S. Manufacturing Multinationals." *Kyklos,* 1980, pp. 308–327.

Finds that international differences in R&D factor costs have little effect on R&D locational decisions.

10.44 Hill, Christoper T. "Technological Innovation: Agent of Growth and Change." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 1–39.

Discusses the contribution of technological innovation to economic growth and productivity. Also discusses its relation to inflation, employment, international trade, and quality of life.

10.45 Hill, Christoper T. and Utterback, James M., eds. *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979. 344 pp.

A collection of essays discussing technological innovation as an agent of growth and change; product and process innovation in industry; the relation between technological innovation and U.S. comparative advantage in international trade; the impact of technological change on environmental, health, and safety regulation; and its relation to labor and productivity.

10.46 Hoddeson, Lillian. "The Emergence of Basic Research in the Bell Telephone System, 1875–1915." *Technology and Culture,* July 1981, pp. 512–544.

Traces the roots of basic research in telephones to technological imperatives, which in turn arose from certain commercial objectives. Discusses such early telephony problems as attenuation, cross talk, and interference from other electrical systems. Chronicles the technical and research activities of the Bell system.

10.47 Holtzer, Lorant. "Innovation in the Hungarian Engineering Industry." *Acta Oeconomica,* 1980, pp. 139–149.

Argues that new engineering products, are inadequate particularly in telecommunications, vacuum technique, and precision engineering, despite adequacy of R&D funds. Bases his argument, in part, rate of replacement of engineering products.

10.48 Horwitz, Paul. "Direct Government Funding of Research and Development: Intended and Unintended Effects on Industrial Inno-

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vation." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 255–291.

Presents data on government funding of R&D in the U.S. and other countries and describes effects on innovation. Discusses policy options and expected and unexpected consequences of government support of R&D.

10.49 House, Peter W. and Ryan, Robert Gerard. *The Future Indefinite: Decision-Making in a Transition Economy.* Lexington, Mass. D.C. Heath. 175 pp.

The authors argue that deepening confusion about technical and scientific issues exists, arising from a massive cultural transition. They discuss the economy in terms of this transition, including trends in technology, regional rivalries, energy shortages, and other variables.

10.50 Joint Economic Committee, U.S. Congress. *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change,* Vol. 3, December 29, 1980, Washington, U.S. Government Printing Office. 521 pp.

Includes studies on the process of innovation in industry; basic research and industrial innovation; research, innovation, and economic change; technical advance and economic growth; and the role of "embedded" technology; (Studies also listed and annotated separately.)

10.51 Judson, Horace Freeland. *The Search for Solutions.* New York, Holt, Rinehart & Winston, 1980. 224 pp.

Examines modes of intellectual discovery, and the role of components of discovery such as investigation, patterns, modeling, and evidence.

10.52 Kay, Neil M. *The Innovating Firm: A Behavioral Theory of Corporate R&D.* New York, St. Martin's Press, 1979. 266 pp.

Examines the process of allocating resources to R&D. Hypothesizes that the firm is a hierarchically organized open system, with R&D a specialized function.

10.53 Kelly, Kenneth H. *The Economics of Risky Innovation.* Doctoral dissertation presented to the State University of New York at Stony Brook, 1979. 67 pp.

Considers the optimal rate of R&D spending for a firm. Applies recent advances in consumer theory to deal with new commodities and surrounding uncertainties. Relates the resources devoted to R&D and new technological knowledge to a production function.

10.54 Kevles, Daniel J. *The Physicists: The History of a Scientific Community in Modern America.* New York, Alfred Knopf, 1978. 489 pp.

Traces the relationship between the science of physics and government, and the development of physics research and instruction in American universities. Also discusses the involvement of physicists with industrial technology and the military.

10.55 Keyworth, George A. II. "The Role of Science in a New Era of Competition." *Science,* August 1982, pp. 606–609.

Discusses some problems arising from restricted R&D budgets, including the restructuring of R&D priorities, and the role of government in basic, as opposed to applied (commercial) research. Advocates closer relations between basic research and business research efforts.

10.56 Kidder, Tracy. *The Soul of a New Machine.* Waltham, Mass., Little, Brown, 293 pp. 1981.

Describes the research and development undertaken for a new model computer, in terms of the intensity of the work pace and the motivation and application of the engineers involved.

10.57 Kohn, Meir and Scott, John T. "Scale Economies in Research and Development: The Schumpeterian Hypothesis." *The Journal of Industrial Economics,* March 1982, pp. 239–250.

The authors seek to demonstrate that the elasticities of both R&D inputs and outputs bear a relationship to the elasticities of an industry's potential return and certain "Schumpeterian" characteristics.

10.58 Konakayama, Akira. *On Diffusion in the Production of an Innovation: An Empirical Analysis.* Doctoral dissertation presented to the

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State University of New York at Buffalo, 1980. 161 pp.

Explores the determinants of deciding on a new product. Applies a theory of qualitative choice in dealing with the problem, postulating the existence of selection probabilities. Uses this model to study the introduction of products such as lasers, nylon, and penicillin. Finds a simple model to be sufficient to explain diffusion.

10.59 Kremer, Richard and Mogee, Mary Ellen. "Two Decades of Research on Innovation: Selected Studies of Current Relevance. In *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change,* Vol. 3. Joint Economic Committee, United States Congress, December 8, 1980. Washington, U.S. Government Printing Office, pp. 138–170.

The authors summarize policy recommendations and present abstracts of 42 studies of innovation studies.

10.60 Krogmann, David W. and Key, Joe. "The Agriculture Grants Program." *Science,* July 10, 1981, pp. 178–181.

The authors trace the evolution of the Competitive Grants Office for the support of basic research in agriculture and human nutrition. They discuss the events leading up to its creation and the controversies surrounding the research efforts sponsored by the Grants Office.

10.61 Kuehn, Thomas J. and Porter, Alan L., eds. *Science, Technology, and National Policy.* Ithaca, N.Y., Cornell University Press, 1981. 530 pp.

A collection of papers dealing with, among other issues, positive and negative aspects of technology and science and participatory technology.

10.62 Langlois, Richard N. *Knowledge, Order and Technology: A Study of the Philosophy and Economics of "Appropriate" Technology.* Doctoral dissertation submitted to Stanford University, 1981. 519 pp.

Examines the use of knowledge in terms of "metaphors" proposed by such authorities as Karl Popper, Friedrich Hayek, Michael Polanyi, and others. Argues that the "machine model" and the "postindustrial" vision are inadequate while the "evolutionary" approach, with the institutions implied in Adam Smith's work is a better model.

10.63 Lee, Tom K. *Microeconomic Foundations of Research and Development.* Doctoral dissertation presented to the California Institute of Technology, 1978. 169 pp.

Examines sources of R&D inadequacies and suggests remedies. Investigates economic determinants of R&D decisions, as well as welfare implications, showing that a monopolist may be less persistent in R&D search than a social decision maker.

10.64 Lewis, Robert. *Science and Industrialization in the USSR: Industrial Research and Development, 1917–1940.* New York, Holmes & Meier, 1979. 211 pp.

Deals with the USSR's underutilization of technology and innovation, whether domestically generated or imported. Argues that the centralization of R&D activity by the state had a deleterious effect on research and the implementation of innovation. Also argues that allocational decisions favored science rather than industrial development.

10.65 Link, Albert. "Basic Research and Productivity Increase in Manufacturing: Additional Evidence." *American Economic Review,* December 1981, pp. 1111–1112.

Confirms previous research that R&D and government support of R&D are significant factors in a firm's productivity growth.

10.66 Link, Albert N. "Rates of Induced Technology from Investments in Research and Development." *Southern Economic Journal,* October 1978, pp. 370–379.

Transforms a firm's R&D investment into technological output. Presents measures of technology developed from the model for 45 manufacturing industries. Estimates that 16 percent of measured productivity growth is attributable to R&D.

10.67 Link, Albert N. *Research and Development Activity in U.S. Manufacturing.* New York, Praeger, 1981. 124 pp.

Presents results of a survey of 174 firms, accounting for 37 percent of manufacturing R&D. Examines the relation between size of firm and R&D spending and examines impact

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of Federal financing of R&D on firm's R&D decisions. Finds size to be a determinant for successful R&D activity.

10.68 Linvill, John G. "University Role in the Computer Age." *Science*, February 12, 1982, pp. 802–806.

Discusses the skills and talents required by computer-designing and -operating personnel. Argues for an expansion of engineering schools to overcome shortages of electronics professionals. Also evaluates the advantages of closer relations between industry and universities in developing personnel.

10.69 Logsdon, John M. "Research, Innovation, and Economic Change: Policy Option for Congressional Consideration." In *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change*, Vol. 3, Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 315–358.

Discusses the contribution of research and innovation to productivity growth, knowledge as a basis for policy, and whether government can stimulate the process of innovation.

10.70 Lynn, Leonard H. *How Japan Innovates: A Comparison with the U.S. in the Case of Oxygen Steelmaking*. Boulder, Colo., Westview Press, 1982. 211 pp.

Compares the stages of adoption of the oxygen steelmaking process in the United States and Japan. Examines government policies, management practices, employment systems, and other variables. Concludes that the Japanese had superior channels for collecting and diffusing foreign technologies, more than compensating for the initial U.S. advantage.

10.71 McLean, I.W. and Round, D.K. "Research and Product Innovation in Australian Manufacturing Industries." *Journal of Industrial Economics*, September 1978, pp. 1–12.

The authors measure the relation between R&D inputs and partial R&D outputs. They argue that the one is not an adequate proxy for the other.

10.72 McMurry, Linda O. *George Washington Carver. Scientist and Symbol*. New York, Oxford University Press, 1981. 367 pp.

Recounts Carver's achievements in hybridizing and improving the sweet potato and the peanut. Describes his relation to poor black farmers, and his efforts to place agricultural science in their service.

10.73 Machlup, Fritz. *Knowledge. Its Creation, Distribution, and Economic Significance*. Vol. 1. *Knowledge and Knowledge Production*. Princeton, Princeton University Press, 1981. 274 pp.

Discusses and defines types of knowledge. Presents a historical overview of concepts of knowledge. Analyzes the expansion of information and information (or knowledge) industries between 1958 and 1975.

10.74 Machlup, Fritz. "Stocks and Flows of Knowledge." *Kyklos*, 1979, pp. 400–411.

Compares the difference between stocks and flows of knowledge, arguing that flows may be measured in physical terms, but stocks cannot. Holds that knowledge flows differ from the flow of goods and services in that the recipient may gain without the transmitter losing knowledge.

10.75 Machlup, Fritz and Leeson, Kenneth. *Information Through the Printed Word: The Dissemination of Scholarly, Scientific and Intellectual Knowledge*. 4 Vols. New York, Praeger, 1978–80, 301 pp.; 338 pp.; 201 pp.; and 313 pp.

The authors analyze the scope, structure, and markets of the book publishing industry; the production, distribution, cost and use of scholarly journals; and the types and number of libraries, their holdings, acquisition patterns, and automatic reporting and recording systems.

10.76 Mansfield, E. and others. "Overseas Research and Development by U.S.-Based Firms." *Economica*, May 1979, pp. 187–196.

The authors present information on the size, scale, organization, and cost of overseas R&D.

10.77 Mansfield, Edwin. "Basic Research and Productivity in Manufacturing." *American Economic Review*, December 1980, pp. 863–873.

Argues that there is a link between basic research and total factor productivity increases

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when applied research expenditures are held constant. Presents data on 119 firms.

10.78 Mansfield, Edwin. "Tax Policy and Innovation." *Science*, March 12, 1982, pp. 1365–1371.

Surveys changes in tax policy in recent years designed to benefit innovating firms. Discusses problems of measuring the rate of innovation and of assessing the effect of favorable tax rates on innovation.

10.79 Martin, F. and others. *The Interregional Diffusion of Innovations in Canada.* Ottawa, Economic Council of Canada, 1979. 187 pp.

The authors investigate lags in the diffusion of technology and the roles they play in explaining productivity differentials in five of Canada's major regions. They focus on diffusion in computers, steel furnaces, roof trusses, ocean cargo containerization, and shopping centers.

10.80 Morehouse, Ward, ed. *Science, Technology, and the Social Order.* New Brunswick, N.J., Transaction Books, 1979. 277 pp.

A collection of articles that critically evaluate the effect of science on developing societies. Some articles stress the destruction of indigenous technologies by those of Western origin; others present strategies to counteract de-industrialization and the widening economic gap between industrial and developing societies.

10.81 Morici, Peter and others. *Canadian Industrial Policy.* Washington, National Planning Association, 1982. 108 pp.

Canada's attempts to emphasize R&D and high technology industries and a more balanced distribution of employment and income among regions, forms the core of this study.

10.82 Mowery, David C. *The Emergence and Growth of Industrial Research in American Manufacturing, 1899–1945.* Doctoral dissertation submitted to Stanford University, 1981. 333 pp.

Develops a portrait of industrial research from 1899 to 1945, reviewing the theoretical and historical literature of the period. Develops employment series for industrial laboratories and examines the relation between independent research organizations and firms' in-house research.

10.83 Mukhopadhyay, Arun K. *Diversification, Research Productivity, Research Intensity and Market Shares.* Doctoral dissertation presented to Brown University, 1979. 146 pp.

Argues that as a firm moves into more product areas in its R&D activity, it will become more productive. Reasons that R&D generates unanticipated inventions and innovations, and diversification multiplies the chances of finding them.

10.84 Mushkin, Selma J. *Biomedical Research: Costs and Benefits.* Cambridge, Mass., Harper & Row, Ballinger, 1979. 457 pp.

Investigates social rate of return of biomedical research comparing it to other research efforts. Calculates net benefits for 1930–75, finding them to greatly exceed costs. Frames her analysis in terms of human capital theory.

10.85 Nadiri, M. Ishaq and Bitros, George C. "Research and Development Expenditures and Labor Productivity at the Firm Level: A Dynamic Model." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research, *Studies in Income and Wealth*, Vol. 44, Chicago, The University of Chicago Press, 1980, pp. 387–412.

The authors investigate the determinants of R&D expenditure in the context of a set of input demand factors. Using a disequilibrium adjustment model of input demands, they examine the consequences of R&D for other inputs. Among the factors they analyze are the short-run effects of output and prices on innovative activities, and the effects of R&D and plant and equipment expenditures on labor productivity.

10.86 National Science Board. *Science Indicators, 1980.* Washington, U.S. Government Printing Office, 1981. 368 pp.

Surveys developments in international science and technology, including R&D outputs. Analyzes resources available for R&D and basic research. Discusses industrial R&D and technological progress, scientific and engineering personnel, and major advances in science.

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10.87 National Science Foundation. *Annual Science and Technology Report to the Congress, 1980.* Washington, U.S. Government Printing Office, 1981. 144 pp.

Reports on Federal R&D programs in national security, space, health, energy, environment, and other fields. Presents papers on specific issues, such as limited university growth, the education of scientists and engineers, and health.

10.88 National Science Foundation. *Federal Funds for Research and Development.* Survey of Science Resources Series. Washington, U.S. Government Printing Office.

Presents, on a fiscal-year basis, statistics by agency, character of work, performer, and field of science. Also presents data on R&D plant, and on basic as well as applied research. Includes historical series.

10.89 National Science Foundation. *The Five-Year Outlook: Problems, Opportunities, and Constraints in Science and Technology.* Vols. I and II. Washington, U.S. Government Printing Office, 1980. 113 pp. and 672 pp.

Discusses earth, biological, and physical sciences; computer, materials, and energy technologies; specific aspects of science in the United States; and scientific institutions. Papers on selected topics cover technology and productivity in agriculture, science and technology policy, and science and technology in State and local governments.

10.90 National Science Foundation. *National Patterns of Science and Technology Resources.* Washington, U.S. Government Printing Office, March 1982. 80 pp.

Provides text, charts, and tables on the sources of funding of R&D; discusses the channels through which R&D funds are spent, the allocation of R&D funds between basic and applied research and development, science and engineering personnel and their employment opportunities, and international comparisons.

10.91 National Science Foundation. *Science and Engineering Degrees: 1950–80.* Special Report NSF 82-307. Washington, U.S. Government Printing Office, 1982. 67 pp.

A compilation of charts and supporting data covering science/engineering bachelors, master's, and doctor's degrees by major field groups and by sex and selected age brackets.

10.92 National Science Foundation. *Science and Engineering Personnel: A National Overview.* Washington, U.S. Government Printing Office, 1980. 48 pp.

Discusses the current use and supply patterns of scientists and engineers, their employment status, and the dynamics of their labor markets.

10.93 National Science Foundation. *Scientists, Engineers, and Technicians in Private Industry: 1978–80.* Special Report, NSF 80-320. Washington, U.S. Government Printing Office, October 1980.

Presents data and analyses of trends in employment by industry and occupation, and technological penetration in industries.

10.94 National Science Foundation. *The Stock of Science and Engineering Master's Degree Holders in the United States.* Special Report. Washington, December 1980. 90 pp.

Presents estimate of population (1978) having a science or engineering master's degree. Discusses determinants of population change, and the share of women degree holders.

10.95 National Science Foundation. *Women and Minorities in Science and Engineering.* Washington, U.S. Government Printing Office, 1982. 124 pp.

Highlights differences in employment patterns between the sexes and races. Reviews labor market conditions by examining unemployment and salary differentials. Also examines how skills are acquired

10.96 Nelkin, Dorothy. "Intellectual Property: the Control of Scientific Information." *Science.* May 14, 1982, pp. 704–708.

Analyzes the sources of disputes over the control of scientific information. Traces disputes to efforts to extend the right of access at an early research stage, proprietary interests, and government restrictions on the free exchange of scientific ideas.

10.97 Nystroem, Harry. *Creativity and Innovation.* New York, Wiley, 1979. 125 pp.

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Develops a framework for studying company development, distinguishing between positional and innovative companies. Examines individual creativity in light of problem solving.

10.98 Orleans, Leo A. "Science, Elitism, and Economic Readjustment in China." *Science*, 29 January 1982, pp. 472–477.

Reviews the changing role of science during and subsequent to the cultural resolution in China. Notes the increase in its importance, together with its persistent elitism. Compares opportunities of American scientists in the United States with their Chinese counterparts, as well as the relation between science and technology in the two countries.

10.99 Orleans, Leo A. ed. *Science in Contemporary China*. Stanford, Stanford University Press, 1980. 600 pp.

A collection of papers on the status and progress in various fields of science in China. The authors discuss science policy, physics, astronomy, chemistry, the earth sciences, and other fields. They find that applied science is stressed, that equipment is often antiquated and funds difficult to obtain, but that great energy underlines the scientific enterprise.

10.100 Otto, Daniel M. *An Economic Analysis of Research and Extension Investments in Corn, Wheat, Soybeans and Sorghum*. Doctoral dissertation submitted to Virginia Polytechnic Institute and State University, 1981. 171 pp.

Estimates rates of return to research and extension investments in corn, wheat, soybeans, and sorghum. Investigates interregional differences.

10.101 Pakes, Ariel and Griliches, Zvi. *Patents and R&D at the Firm Level: A First Look*. Working Paper No. 561. Cambridge, Mass., National Bureau of Economic Research, October 1980. 33 pp.

Drawing on data from large corporations, the authors find that there is a statistically significant relationship between a firm's R&D expenditures and the number of patents it applies for and receives.

10.102 Peckham, Brian W. *Economics of Invention: A Technological History of the Corn Refining Industry in the United States*. Doctoral dissertation presented to the University of Wisconsin—Madison, 1979. 687 pp.

Argues that important innovations are always associated with invention markets having many suppliers and with economic growth in given industries. Develops methods for writing technological history. Details changes in the technology of corn refining during the 19th and 20th century. Notes the wide variety of the sources of invention.

10.103 Press, Frank. "Rethinking Science Policy." *Science*, October 1, 1982, pp. 28–30.

Discusses the resurgence of R&D investment by American industry. Argues for an industry-government accord for public financing of basic research, increased R&D productivity, industry support of university research, and other relevant areas.

10.104 Ranftl, Robert M. "Making Research and Development Work." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth*. New York, Van Nostrand Reinhold, 1981, pp. 205–239.

Describes steps to improve the productivity of R&D. Discusses improvement in employee productivity by means of proper job assignments, avoidance of "misemployment," use of promotional ladders, and dealing with technological obsolescence of employee skills. Recommends ways to evaluate productivity.

10.105 Ray, G.F. "The Contribution of Science and Technology to the Supply of Industrial Materials." *National Institute Economic Review*, May 1980, pp. 33–52.

Surveying the history of about three dozen industrial materials, the authors find some to have been developed because of a specific need, while others resulted from random scientific or technological developments. They believe that continued applications of science and technology will overcome possible scarcities.

10.106 Ray, Robert S. and Stepanov, Boris. "Scientific and Technological Progress in Eastern European Countries of the Council for Mutual Economic Assistance." *Labour and Society*, January–March 1981, pp. 55–67.

The authors discuss incentive systems to spur scientific and technological progress, progress planning, the organization of produc-

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tion and management improvement, and problems of skill shortages.

10.107 Rich, Robert F., ed. *The Knowledge Cycle.* Beverly Hills, Sage, 1981. 222 pp.

A collection of research papers discussing the creation, diffusion, and uses of knowledge.

10.108 Rosegger, Gerhard. *The Economics of Production and Innovation: An Industrial Perspective.* New York, Pergamon Press, 1980. 404 pp.

Deals with the theory of production and technological change, the relation between technology and scale, research and invention, the patent system, technological progress, and other topics.

10.109 Rothenberg, Albert. *The Emerging Goddess: The Creative Process in Art, Science, and other Fields.* Chicago, University of Chicago Press, 1979. 440 pp.

Describes a method to determine creativeness presenting empirical studies in support of underlying concepts.

10.110 Ruttan, Vernon W. "Changing Role of Public and Private Sectors in Agricultural Research." *Science,* April 2, 1982, pp. 23–29.

Examines the role of public and private sectors with respect to mechanization, plant variety, and insecticide R&D. Argues for a continued public sector role for plant variety and insecticide R&D.

10.111 Sahal, Devendra, ed. *Research, Development, and Technological Innovation.* Lexington, Mass., D.C. Heath, 1980. 274 pp.

A collection of papers emphasizing the management of technological change, the uses of research activity, and "learning by doing." Among findings is an indication that smaller firms generate innovations more successfully than larger firms.

10.112 Sato, Ryuzo and Nono, Takayuki. "A theory of Endogenous Technical Progress: Dynamic Boehm-Bawerk Effect and Optimal R&D Policy." *Zeitschrift fuer Nationaloekonomie,* 1982 (1), pp. 1–22.

The authors argue that a combination of basic and applied research underlies productivity improvement, holding that basic research should be treated as intermediate to the production of technology attained in applied research. They also suggest that the production function depends on the stock of technical knowledge, not on current research alone.

10.113 Scherer, F.M. "Demand Pull and Technological Invention: Schmookler Revisited." *The Journal of Industrial Economics,* March 1982, pp. 225–238.

Holding that demand plays a leading role in determining the magnitude and direction of inventive activity, the author finds that demand-pull indices and associated patent flows relate positively, and that the correlation between capital goods patenting and industry investment are very high.

10.114 Scherer, F.M. *Research, Development, Patenting, and the Micro Structure of Productivity Growth. Final Report.* Washington, National Science Foundation, June 1981. 27 pp.

Summarizes methods and findings of interindustry technology flows derived from detailed analysis of patent data. Examines the relation of these flows to productivity indices. Hypothesizes that the locus of R&D usage differs from the R&D originating industry.

10.115 Seskin, Eugene P. and Lave, Lester B. "Enhancing the Contributions of Science and Technology in Environmental, Health and Safety Regulations." In *The Five-Year Outlook: Problems, Opportunities, and Constraints in Science and Technology.* Vol. II. National Science Foundation. Washington, U.S. Government Printing Office, 1980, pp. 593–606.

The authors explore the regulatory processes involving the environment, health, and safety in light of how science and technology can improve them.

10.116 Silkman, Richard H. *The Diffusion of Educational Innovations.* Doctoral dissertation presented to Yale University, 1980. 216 pp.

Explores reasons for adoption of educational innovations and their diffusion. Studies such innovations as educational television and computer-managed instruction. Finds no definite patterns of adoption and doubts a general theory of innovation for this sector can be developed.

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10.117 Sriram, V., and others, eds. *Top 300 Companies, Imports, Exports, Foreign Collaboration Agreements, and R&D.* New Delhi, Economic and Scientific Research Foundation, 1979.

The authors examine the characteristics of Indian agreements for the acquisition of technology from advanced countries and the impact of these agreements on R&D in Indian firms. They find higher profitability for firms collaborating with other countries, but also that local R&D was often focussed on de-scaling technology and improving raw materials.

10.118 Sveikauskas, Catherine D. and Sveikauskas, Leo. "Industry Characteristics and Productivity Growth." *Southern Economic Journal,* January 1982, pp. 769–774.

The authors examine the relation among several industrial characteristics, among them R&D and multifactor productivity growth. They find R&D—that is, science and knowledge—to be the only influence with a consistently positive effect on productivity growth.

10.119 Switzer, Lorne N. *Industrial R&D in the United States: A New Look at Determinants, Effects of Government Expenditures, and the Effects of Inflation.* Doctoral dissertation submitted to the University of Pennsylvania, 1982. 251 pp.

Finds that the firm's cash flow represents a significant determinant of interfirm differences in R&D expenditures and that firms are averse to externally financing R&D.

10.120 Terleckyi, Nestor E. "Direct and Indirect Effects of Industrial Research and Development on the Productivity Growth of Industries." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research. *Studies in Income and Wealth,* Vol. 44. Chicago, The University of Chicago Press, 1980, pp. 359–377.

Tests earlier studies of the contribution of R&D to productivity advance in industries conducting R&D and in industries purchasing capital and intermediate output. Examines R&D effects on previously unmeasured inputs, particularly human capital, intermediate goods, and physical capital.

10.121 Terleckyj, Nestor E. "What Do R&D Numbers Tell Us About Technological Change?" *American Economic Review,* May 1980, pp. 55–61.

Reviews past research and theory. Outlines an approach for constructing systematic data focusing on technological change.

10.122 Thesing, Claudia I. *Strategy, Structure, and Innovative Activity.* Doctoral dissertation submitted to the University of Connecticut, 1981. 204 pp.

In light of the post World War II emergence of the diversified firm, the author seeks to identify and assess the relationships among a firm's strategic orientation, organization, and innovative activities. She finds that diversification strategy promotes R&D intensity.

10.123 Tisdell, C.A. *Science and Technology Policy: Priorities of Governments.* New York, Methuen, 1981. 222 pp.

Discusses economic and social factors underlying the formulation and planning of science policy. Discusses policies in nine OECD countries, arguing that the technology in which science is embedded should be shaped in accordance with economic and social goals.

10.124 U.S General Accounting Office. *Major Science and Technology Issues.* Study by the Staff. Washington, January 30, 1981

Identifies emerging issues related to Federal Government involvement in science and technology, and describes GAO's efforts in this area.

10.125 U.S. General Accounting Office. *Small Businesses Are more Active as Inventors than as Innovators in the Innovation Process.* Report to the Chairman, Committee on Small Business, U.S. House of Representatives. Washington, December 31, 1981. 20 pp.

The report examines a number of studies, concluding that small business has made important contributions to innovation, but that they have been more active as inventors than as innovators.

10.126 U.S. President's Commission for a National Agenda for the Eighties. *Science and Technology. Promises and Dangers in the Eighties.* Washington, U.S. Government Printing Office, 1980. 93 pp.

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Examines the history of Federal involvement in science and technology, current social and economic environment of science and technology enterprise, and resource constraints. Recommends that Government remain the primary patron of basic science.

10.127 Utterback, James M. "The Dynamics of Product and Process Innovation in Industry. In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 40–65.

Argues that the conditions for rapid innovation differ from those required for high levels of output and efficiency in production, the former involving flexible, the latter inflexible patterns of organization.

10.128 Warner, Kenneth E. "The Role of Science and Technology in the Containment of Health Care Costs." In *The Five-Year Outlook. Opportunities and Constraints in Science and Technology.* Vol. II. National Science Foundation. Washington, U.S. Government Printing Office, 1980, pp. 579–592.

Identifies the determinants of health, particularly nonmedical ones. Stresses the impact of science and technology on health care outside medical care, as well as possible shifts from surgical to medical care. Argues for emphasis upon prevention of illness.

10.129 White, Fred C. and Havlicek, Joseph, Jr. "Optimal Expenditures for Agricultural Research and Extension: Implications of Underfunding." *Journal of Agricultural Economics,* February 1962, pp. 47–55.

The authors argue that significant increases in agricultural productivity in the United States are required to ensure a stable and abundant food supply. They calculate the cost of underfunding research and extension work to government and households.

10.130 Wilson, Robert W. and others. *Innovation, Competition and Government Policy in the Semiconductor Industry.* Lexington, Mass., Heath, 1980. 219 pp.

The authors anlayze the effects of different competitive strategies and government polices. They find that in firms producing integrated circuits, top management involvement in technology and risk-taking are related to major innovations, while capital availability and R&D spending is linked to incremental innovation.

10.131 Wulff, Keith M., ed. *Regulation of Scientific Inquiry.* Boulder, Col., Westview Press, 1979. 222 pp.

The authors discuss the desirability of regulating research in such fields as recombinant DNA research, extraterrestrial intelligence, laser enrichment, and others. They also explore the relation between regulatory agencies and scientific inquiry.

10.132 Yu, Benjamin T. *The Economics of Patent Pools: The Capturing of the Return to Basic Research.* Doctoral dissertation presented to the University of Washington, 1978. 245 pp.

Explores the problem of a return to basic research. Argues that the problem arises chiefly in competition among inventors seeking to improve on the basic ideas, under the constraint of transaction costs. Further argues that the pooling of patents constitutes a contract between the "superior" and the "inferior" inventor. Discusses relevant aspects of patent law and forms of patent pools.

Energy, economies of scale, and other factors

11.1 Antal, Laszlo. "Development—With Some Digression: The Hungarian Economic Mechanism in the Seventies." *Acta Oeconomica,* 1979, pp. 257–273.

Noting that older bargaining relationships between enterprises and control agencies were revived after 1976, argues that the quick slowdown of decentralization efforts in the Hungarian economy was meant to increase the independence of enterprises.

11.2 Asian Productivity Organization. *Development of Management Consultancy in APO Member Countries.* New York, Unipub, 1978. 185 pp.

A report on a survey of problems and needs in management consulting for small and medium-size firms, emphasizing the activities of National Productivity Organizations.

11.3 Asian Productivity Organization. *International Subcontracting: A Tool of Technology Transfer.* Tokyo, 1978. 132 pp.

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The authors distinguish among various types of subcontracting and offer policy recommendations.

11.4 Baden, John and others. "Myths, Admonitions, and Rationality: The American Indian as a Resource Manager." *Economic Inquiry*, January 1981, pp. 132–143.

The authors present evidence to show that, to Indians as resource managers, incentives matter most, and ethical considerations matter to the extent that they influence institutions.

11.5 Bremer, Jennifer A. *Alternatives for Mechanization: Public Cooperatives and the Private Sector in Egypt's Agriculture.* Doctoral dissertation submitted to Harvard University, 1982, 451 pp.

Compares the performance of public cooperatives and private firms in furnishing tractor services to farmers. Finds the cooperatives to be less efficient, and less likely to reach poorer farmers than private services.

11.6 Budde, James E. *Measuring Performance in Human Service System: Planning, Organization, and Control.* New York, Amacom, 1979. 207 pp.

Specifies organizational performance standards in services designed to assist in eliminating or reducing social problems. Shows how standards should be implemented.

11.7 Cable, J.R. and Fitzroy, F.R. "Productive Efficiency, Incentives, and Employee Participation: Some Preliminary Results for West Germany." *Kyklos*, 1980, pp. 100–121.

The authors present an economic theory of social interaction among members of a firms, based on individual rationality. The make assumptions of the effects on profit-sharing, piece rates, and employee participation in decision-making, finding positive effects on productivity.

11.8 Cherns, A.B. "Speculations on the Social Effects of New Microelectronics Technology." *International Labour Review*, November-December 1980, pp. 705–721.

Discusses the effects of microelectronics on the structure of work and corporate organization, on white-collar work, and on employment.

11.9 Christeinsen, Gregory B. and Haveman, Robert H. "Public Regulations and the Slowdown in Productivity Growth." *American Economic Review*, May 1981, pp. 320–325.

The authors develop a method of accounting for regulation as a factor in the productivity slowdown, They find that regulation is responsible for up to 21 percent of the slowdown in manufacturing in 1973–77.

11.10 Clawson, Dan. *Bureaucracy and the Labor Process: The Transformation of U.S. Industry, 1860–1920.* New York, Monthly Review Press, 1980. 284 pp.

Traces the relation between organizational and technological evolution in American industry. Discusses the evolution of management as the result of the attempt to concentrate knowledge of production, and to end inside contracting of work.

11.11 Cornell, Nina W. and Webbink, Douglas W. "Common Carrier Regulation and Technological Change: The New Competition in the Communications Industry." In *Government Regulation: Achieving Social and Economic Balance. Special Study on Economic Change*, Vol. 5. Joint Economic Committee, U.S. Congress, December 8, 1980. Washington, U.S. Government Printing Office, pp. 197–224.

The authors discuss, various aspects of the regulatory process and external factors linked to it. They also discuss the relation between monopolies and technological change.

11.12 Crandall, Robert W. "Regulation and Productivity Growth." *In the Decline in Productivity Growth.* Proceedings of a conference. Boston, Federal Reserve Bank, pp. 93–114. [Includes comments by Hendrick C. Houthakker.]

Shows that manufacturing industries most heavily affected by worker safety and pollution regulations suffered the steepest declines in productivity improvement. Notes the difficulty to prove causality between the regulations and declining productivity improvement. Also, maintains that no diversion of capital occurred in these industries because of new regulatory requirements.

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11.13 Denison, Edward F. "Research Concerning the Effect of Regulation on Productivity." In *Dimensions of Productivity Research, Proceedings of the Conference on Pro-Productivity Research,* The American Productivity Center, Houston, Texas, April 21-24, 1980, pp. 1015-1025.

Argues that estimates of regulation's effect on productivity must be quantitative and pertain to specified productivity series. Discusses types of effects, including the diversion of labor and capital to effect regulations.

11.14 Donnelly, John Fenlon. "The Role of the Chief Executive in Productivity." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth.* New York, Van Nostrand Reinhold, 1981, pp. 117-141.

Discusses factors promoting and retarding productivity advance in private business. Suggests models for dealing with productivity problems.

11.15 Eads, George C. "Regulation and Technical Change: Some Largely Unexplored Influences." *American Economic Review,* May 1980, pp. 50-54.

Holds that regulation may divert resources from research, change a firm's ability to calculate payoffs, change patterns of research, and may alter the proportion of benefits that might be classified as "externalities."

11.16 Flynn, David M. *The Rationalization of the United States and Canadian Automotive Industry: 1960-75.* Doctoral dissertation presented to the University of Massachusetts, 1979. 177 pp.

Examines the effect of the U.S.-Canadian Automotive Agreement of 1965 regarding the creation of a broader market for automotive products and the attainment of economic patterns of investment, production, and trade. Finds that although Canada benefited, investment policies have remained biased toward the United States.

11.17 Frantz, Roger S. "On the Existence of X-Efficiency." *Journal of Post-Keynesian Economics,* Summer 1980, pp. 509-527.

Argues that while research in x-efficiency has focused on cost, profits and the technological adaptability of the firm, x-efficiency is confirmed by what psychologists refer to as the self-actualizing person, and the existence of such persons suffices to account for x-efficiency.

11.18 Friedlaender, Ann, and others. "Regulation and the Structure of Technology in the Trucking Industry." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney E. Stevenson, eds. New York, Academic Press, 1981, pp. 77-106.

The authors find that trucking costs would be lower if average loads were increased, and that savings of fuel and other costs would result. They conclude that unless regulators permit greater operating efficiencies, regulation will retard productivity improvement.

11.19 Fusfeld, Herbert I. and Haklisch, Camela S., eds. *Industrial Productivity and International Technical Cooperation.* New York, Pergamon Press, 1982. 155 pp.

A collection of conference papers dealing with topics such as private sector involvement in technical agreements between governments and opportunities for enhancing productivity in R&D. Industries covered include communications, electronics, energy conversion, and environmental control.

11.20 Gillis, Malcolm. "Allocative and X-Efficiency in State-Owned Mining Enterprises. Comparisons Between Bolivia and Indonesia." *Journal of Comparative Economics,* March 1982, pp. 1-23.

Argues that the presence of significant x-inefficiencies yields important insights into the operation of state-run industries.

11.21 Goldman, Paul and Van Houten, Donald R. "Uncertainty, Conflict, and Labor Relations in the Modern Firm I: Productivity and Capitalism's 'Human Face.'" *Economic and Industrial Democracy,* February 1980, pp. 63-98.

The authors focus on productivity as a major problem between labor and management in a time of slowed productivity growth. They evaluate management attitudes toward unions in light of the slowdown, as well as such approaches to coping with it as human relations, incentives, job enrichment, and democratization of workplace decisions.

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11.22 Gordon, Theodore J. "The Revival of Enterprise." In *Research and Innovation: Developing a Dynamic Nation. Special Study on Economic Change.* Vol. 3. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp. 370–379.

Discusses reasons why productivity growth has declined, and the possibility of reviving it by reinvigorating enterprise.

11.23 Goshi, Kohei. "The Productivity Movement in Japan." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 677–683.

After describing some cultural differences between Japan and the West, the author discusses the role of the Japan Productivity Center in aiding the modernization of Japanese management. He stresses the latter's indebtedness to U.S. management practices.

11.24 Hall, William P. *The Effects of the Learning Curve on Strategic Firm Behavior and Economic Performance.* Doctoral dissertation submitted to the University of Michigan, 1982. 146 pp.

Defining learning in terms of future cost reductions, the author concludes that the learning curve constitutes a barrier to entry, and that the resulting concentration leads to an unsatisfactory level of performance.

11.25 Haywood, Charles F. "Regulation, Technological Change, and Productivity in Commercial Banking." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney S. Stevenson, eds. New York, Academic Press, 1981, pp. 283–307.

Discusses the regulatory regime of commercial banking, and, recent new directions in the industry. Presents and discusses data bearing on productivity and discusses economies of scale and diffusion of innovations.

11.26 Hayes, Robert H. and Abernathy, William J. "Managing Our Way to Economic Decline." *Harvard Business Review,* July–August 1980, pp. 67–75.

The authors attribute the productivity slowdown and the lagging U.S. productivity rate to management failure. They tie management failure to the lack of analysis of how production functions, and to emphasis on short-term cost reductions rather than long-term development of technological competitiveness.

11.27 Hogan, John D. "Interfirm Comparisons: Current State and Future Prospects." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 319–337.

Describes the role of trade associations in servicing firms with productivity performance standards. Discusses the desirable characteristics of interfirm comparisons, as well as the performance measurement system developed by the American Productivity Center. Evaluates the various approaches.

11.28 Horvitz, Wayne L. "Labor-Management Committees: Their Impact on Productivity." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth.* New York, Van Nostrand, Reinhold, 1981, pp. 276–295.

Discusses various productivity concepts. Describes the work of a number of prominent labor-management committees and their effect on productivity.

11.29 Johnson, Chalmers. *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975.* Stanford, California, Stanford University Press, 1982. 393 pp.

Analyzes Japan's economic growth as exemplifying a state-guided market system. Focuses on Japan's economic bureaucracy, and discusses the market-conforming methods of the Ministry of International Trade and Industry. Doubts that Japan's institutional patterns are transferable to other countries.

11.30 Joint Economic Committee, U.S. Congress. *Business Management Practices and the Productivity of the American Economy.* Hearings, May 1 and 11, June 1 and 5, 1981. Washington, U.S. Government Printing Office. 146 pp.

Contains statements and remarks by public and private spokespersons on the title subject. Includes reports on sources of productivity in consumer electronics, and management's responsibility in the productivity slowdown.

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11.31 Joint Economic Committee, U.S. Congress. *Japanese and American Economic Policies and U.S. Productivity.* Hearings, June 23 and July 28, 1981. Washington, U.S. Government Printing Office. 254 pp.

Contains statements and remarks by private spokespersons on the title subject. Includes reports on sources of Japanese quality performance and machine tool production practices, and on American and Japanese steel facility installation practices.

11.32 Jones, Leroy P. and Sakong, Il. *Government, Business, and Entrepreneurship in Economic Development: The Korean Case.* Cambridge, Mass., Harvard University Press, 1980. 434 pp.

Using a case study approach the authors discuss the effect of government policy on Korea's economic development and evaluate the role of entrepreneurship. They argue that there has been a qualitative improvement in the existing generation of entrepreneurs, deriving chiefly from the pre-industrial elite, its high educational level, and its facility to adapt to industrialism.

11.33 Kent, Calvin A., and others, eds. *Encyclopedia of Entrepreneurship.* Englewood Cliffs, N.J., Prentice-Hall, 1982. 425 pp.

The authors categorize available knowledge about entrepreneurship, innovation, and the process of technology transfer. They also discuss research and education in entrepreneurship.

11.34 Kiers, Luc. *The American Steel Industry.* Problems, Challenges, Perspectives. Boulder, Colo., Westview Press, 1980. 176 pp.

Appraises technology, management, labor and investment. Analyzes the competitive edge of the Japanese steel industry. Presents policy proposals.

11.35 Kirzner, Israel, and others, eds. *The Prime Mover of Progress: The Entrepreneur in Capitalism and Socialism. Papers on the Role of the Entrepreneur.* Central Islip, N.Y., Transatlantic Arts, 1980. 154 pp.

A collection of essays discussing the theory of entrepreneurship; the entrepreneur in British economic history; entrepreneurship in plastics, transport, and private and state industries; and the sociology of entrepreneurship.

11.36 Klein, Burton H. "The Slowdown in Productivity Advances: A Dynamic Explanation." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 66–117.

Argues that the slowdown in productivity is linked to declining technological innovation, which is related in turn to declining ability of American business to take risks and declining entrepreneurship.

11.37 Landen, D.L. "Labor-Management Cooperation in Productivity Improvement." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 415–451.

Discusses why the term productivity is often in dispute, and describes labor-management cooperation as it relates to productivity.

11.38 Lazonick, William H. "Production Relations, Labor Productivity, and Choice of Technique: British and U.S. Cotton Spinning." *The Journal of Economic History,* September 1981, pp. 491–516.

Analyzes the impact of capital-labor relations on the level and structure of wages, labor productivity, and choice of techniques.

11.39 Leff, Nathaniel H. "Entrepreneurship and Economic Development: The Problem Revisited." *Journal of Economic Literature,* March 1979, pp. 46–64.

After examining the "problem" of entrepreneurship in developing countries, the author turns to its solution and the extent to which it has been transformed. A bibliography also is included.

11.40 Liebenstein, Harvey. *General X-Efficiency Theory and Economic Development.* New York, Oxford University Press, 1978. 189 pp.

Explains the theory of x-efficiency and discusses knowledge of opportunities as an input to the firm.

11.41 Lewis, Jordan D. "Technology, Enterprise, and American Economic Growth." *Science,* March 5, 1982, pp. 1204–1211.

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Discusses reasons for U.S. decline from technological preeminence in the 1960's. Disputes such common explanations as too much regulation, inadequate expenditures on R&D, and insufficient investment. Holds inflation to have been a cause of short-term planning, arguing for inflationary restraints to encourage long-term planning.

11.42 Link, Albert N. "Firm Size and Efficient Entrepreneurial Activity: A Reformulation of the Schumpeter Hypothesis." *Journal of Political Economy*, August 1980, pp. 771–782.

The author examines the relation between innovative activity, measured by the rate of return to R&D development expenditures, and firm size. Finds size to be a prerequisite for successful innovative activity.

11.43 MacAvoy, Paul and Tella, Dorothy M. "The Impact of Regulation on the Performance of Industry." In *Government Regulation: Achieving Social and Economic Balance. Special Study on Economic Change*, Vol. 5. Joint Economic Committee, U.S. Congress, December 8, 1980. Washington, U.S. Government Printing Office, pp. 176–196.

After discussing the scope of regulation across various industries, the authors analyze anticipated and realized effects of regulation and quality-of-life improvements.

11.44 Macchia, Anthony F. *An Economic Theory of the Hospital and the Industrial Organization of the Hospital Market: A Study in the Economic Modeling of Decision Processes, Internal Organizational Behavior, and Strategic Interaction.* Doctoral dissertation presented to the University of Pennsylvania, 1979. 513 pp.

Considers the role of patients, physicians, administrators, trustees, and owners in determining hospital behavior. Discusses the effects of information signalling among the various groups, the formulation of third-party payments, hospital staff privileges, and other factors.

11.45 Meyer, Stephen III. *The Five Dollar Day. Labor, Management and Social Control in the Ford Motor Company, 1908–1921.* Albany, State University of New York Press, 1981. 249 pp.

Examines management responses to labor troubles, especially to very high turnover rates, at Ford Motor Company. Finds the relatively high wages paid were designed to do so to reduce labor turnover but failed. Traces high turnover to mass production practices.

11.46 Miller, J.B. and Thorton, J.R. "Effort, Uncertainty, and the New Soviet Incentive System." *Southern Economic Journal*, October 1978, pp. 432–446.

The authors analyze the Soviet incentive system introduced in 1971, finding the system has had desirable informational and motivational properties.

11.47 Moore, John H. *Growth with Self-Management: Yugoslav Industrialism, 1952–1975.* Stanford, Calif. Hoover Institution Press, 1980. 334 pp.

Discusses the economic policy underlying workers' self-management organizations. Offers measures of growth paralleling those used in other industrialized countries. Appraises investment, productivity, and regional effects of development.

11.48 Musoke, Moses M. and Olmstead, Alan L. "The Rise of the Cotton Industry in California: A Comparative Perspective." *Journal of Economic History*, June 1982, pp. 385–412.

The authors compare the institutional settings of cotton production in California and the South, exploring the reasons for earlier mechanization of cotton agriculture in California.

11.49 Naples, Michele I. "Industrial Conflict and its Implications for Productivity Growth." *American Economic Review*, May 1981, pp. 36–41.

Demonstrates that increases in strike activity were over working conditions rather than wage issues during the 1960's and 1970's. Argues that deteriorating working conditions reflected pressures for higher productivity, and implies that worker militancy defeated these pressures.

11.50 Nelson, Daniel, *Frederick W. Taylor and the Rise of Scientific Management.* Madison, University of Wisconsin Press, 1980. 259 pp.

Holds that Taylor's innovations in factory technology and innovation outranked in im-

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portance their effect on workers, which were slight. Believes that Taylor was the single most important contributor to the "new" factory system, which shifted authority from the foreman to management.

11.51 Nelson, Randy Alan. *Regulation and Technical Change in the Electric Utility Industry: 1948–75.* Doctoral dissertation presented to the University of Illinois at Urbana-Champaign, 1979. 183 pp.

Examines the effect of rate-of-return regulation on the rate and direction of technical change. Finds such regulation to have had a statistically important effect on fuel and labor-related technologies during 1948–60 and 1971–75.

11.52 Norris, James D. *R.G. Dun & Co., 1841–1900: The Development of Credit Reporting in the 19th Century.* Westport, Conn., Greenwood Press, 1978. 206 pp.

Examines the transformation of credit reporting to credit rating, the shift in emphasis from personal recommendation to incorporating capital worth, cash flow, debt outstanding, and so forth. Finds that Dun pioneered key management techniques.

11.53 Pesky, Henry M., and others. *Environmental Regulation and the U.S. Economy.* Baltimore, Johns Hopkins University Press, 1981. 164 pp.

The authors discuss the effect of environmental regulation on productivity and other variables. They also discuss the question of how to include the effects of those regulations in the national product.

11.54 Olson, Mancur. *The Rise and Decline of Nations. Economic Growth, Stagflation, and Social Rigidities.* New Haven, Yale University Press, 1982. 273 pp.

Argues that the inclination of small special interest groups to press for a larger share of the national income, tends to reduce social output. Holds that democratic countries with freedom of organization suffer more than others from such reductions in growth. Cites evidence from the United States and United Kindgom postwar experience. Believes that the destruction of special interest groups by totalitarian regimes freed the postwar economies of Germany and Japan, explaining their growth.

11.55 Oswald, Rudy. "Unions and Productivity." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth.* New York, Van Nostrand Reinhold, 1981, pp. 97–113.

Holds that workers and unions have contributed to productivity growth. Discusses problems of productivity measurement and underlying variables.

11.56 Oveisi, Hadi F. *Entrepreneurial Activities of the Public Sector in the Economic Development Process. (A Comparative Study of Mexico and Iran.)* Doctoral dissertation presented to the University of Texas at Austin, 1979. 273 pp.

Applies the framework of the innovational process originated by Schumpeter to public sector developmental activities. Evaluates the financial and industrial activities of these sectors in terms of their entrepreneurship.

11.57 Peters, Edward E. *Scientific Management and Technological Change.* Doctoral dissertation submitted to West Virginia University, 1980. 140 pp.

Measures the productivity-raising effects of organization improvements, workplace methods improvements, and incentive pay plans. Finds measureable productivity gains in given case studies.

11.58 Prokhorov, Vasily I. "Influence of Trade Union Organizations at National and Enterprise Levels on Establishing Productivity and Remuneration Standards in the USSR." *Labour and Society.* July–September 1981, pp. 263–277.

After outlining the role and position of trade unions in the USSR, the author discusses the reduction of the work day, setting of work standards, improvement in working conditions, the principle of remuneration according to work, and related matters.

11.59 Rolph, Elizabeth S. *Nuclear Power and the Public Safety: A Study in Regulation.* Lexington, Mass., D.C. Heath, 1979, 213 pp.

Explores obstacles faced by regulators in dealing with a new technology. Discusses measures of effectiveness of regulation. [illegible]es its history, especially licensing procedures, and the effect of rising concern over safety.

11.60 Scherer, F.M. "The Causes and Consequences of Rising Industrial Concentration." *Journal*

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of Law and Economics, April 1979, pp. 191–208.

Examines reasons why unit costs fall more rapidly in manufacturing industries with rising seller concentration. Finds a greater concentration of consumer goods suppliers in 1947–67 and a higher incidence of product and marketing innovation.

11.61 Schertz, Lyle P., and others. *Another Revolution in U.S. Farming?* Agricultural Economics Report No. 441. Washington, U.S. Department of Agriculture, 1979. 445 pp.

Papers describing the transformation of the organization and production management of livestock and crops in the United States. Among factors contributing to this change, are new capital-intensive technologies, nonfarm job opportunities for redundant labor, and availability of credit.

11.62 Siegel, Irving H. and Weinberg, Edgar. *Labor-Management Cooperation. The American Experiment.* Kalamazoo, Mich., The Upjohn Institute for Employment Research, 1982. 316 pp.

Drawing on a large number of case histories, the authors examine labor-management committees in steel, construction, retail food, railroads, and men's clothing, and analyze joint programs aimed at improving company performance.

11.63 Sirc, Ljubo. *The Yugoslav Economy under Self-Management.* New York, St. Martin's Press, 1979. 270 pp.

Noting that Yugoslav economic growth does not exceed rates of other East European countries, the author discusses economic growth, unemployment, and inflation in relation to the institutions of the Yugoslav economy. Chronicles the dismantling of central planning during the 1950's and the subsequent evolution of self-management. Details disproportions in economic development and other fundamental problems.

11.64 Smith, Kenneth R. and Over, Mead A. Jr. "The Effect of Health Manpower Regulations on Productivity in Medical Practices." In *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney S. Stevenson, eds. New York, Academic Press, 1981, pp. 309–343.

The authors examine the technology of ambulatory care, and trace physician productivity in terms of the shift from home visits to office visits, and from direct physician services to services provided by other health practitioners and a combination of these services. They also review the problems of defining productivity in the medical care sector.

11.65 Smith, Richard Lester. *The United States Automobile Industry: Three Studies of Industry Conduct and Structural Change.* Doctoral dissertation presented to the University of California, Los Angeles, 1979. 264 pp.

Hypothesizes on the collusive effect and economic efficiency of trade associations in the auto industry. Examines vertical integration in 1919–39 and studies the effect of the 1959 Automobile Information Disclosure Act on pricing.

11.66 St. Clair, David J. *Entrepreneurship and the American Automobile Industry.* Doctoral dissertation presented to the University of Utah, 1979. 404 pp.

Discusses the replacement of the electric trolley with motor buses as part of an alleged conspiracy by the auto manufacturers of the period. Finds that the auto industry sought to influence highway construction policies so that highways would run through urban centers, making it possible to tap urban markets for autos. Treats these findings as a type of social innovation along Schumpeterian lines.

11.67 U.S. General Accounting Office. *Productivity Sharing Programs: Can They Contribute to Productivity Improvement?* Washington, March 3, 1981. 33 pp.

Discusses the nature and effectiveness of various financial and nonfinancial incentive systems, as they relate to individuals as well as groups. Surveys a number of firms with such systems and explores their influence on productivity.

11.68 U.S. House of Representatives, Subcommittee on Economic Stabilization of the Committee on Banking, Finance and Urban Affairs. *Productivity Performance and the American Economy.* Hearings. June 24; July 29; August 27, 1980. Washington, U.S Government Printing Office, 1980. 318 pp

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Contains the text of a bill that would establish a National Productivity Council and National Productivity Council Advisory Board, together with testimony by public officials and private experts.

11.69 Usilaner, Brian. "Can We Expect Productivity Improvement in the Federal Government?" *Public Productivity Review*, September 1981, pp. 237–246.

Discusses impediments to productivity improvement, such as lack of incentives, the personnel system, arbitrary resource controls, low morale and pay structure, and lack of administrative capability. Suggests some remedies.

11.70 Vander Elst, Philip. *Capitalist Technology for Soviet Survival.* Central Islip, N.Y., Transatlantic Arts, 1981. 63 pp.

Examines how organizational weaknesses in the Soviet system are counterbalanced by Western technology. Examines the inability of the Soviet economy to generate innovations. Holds that Western technology has had a favorable effect on the Soviet system since the 1920s.

11.71 Vogel, Morris J. *The Invention of the Modern Hospital.* Boston, 1870–1930. Chicago, University of Chicago Press, 1980. 172 pp.

Traces the transition of medical practice from the home to the hospital. Cites as reasons the influence of new medical and surgical procedures, growing professionalization of medical personnel, and the effects of urbanization on the family's ability to take care of its sick.

11.72 Wagner, Karin. "Competition and Productivity. A Study of the Metal Can Industry in Britain, Germany, and the United States." *Journal of Industrial Economics*, September 1980, pp. 17–35.

Shows that strong inter- and intra-industry competition and an alert antitrust climate have spurred the development and rapid implementation of new technologies in the United States. Holds that productivity in metal cans is three times the level of Germany and Britain, where competition is weak, and employment protection and union attitudes have retarded gains.

11.73 Walton, Richard E. "Planned Changes to Improve Organizational Effectiveness." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 203–231.

Assesses the state of knowledge about the conditions required to effect planned changes. Discusses possible reasons for dissatisfaction with the managerial status quo, models of the changes being desired, and transition processes.

11.74 Weinberg, Edgar, ed. *Labor-Management Cooperation: Recent Efforts and Results.* Bulletin 2153. Department of Labor, U.S. Bureau of Labor Statistics, December 1982. Washington, U.S. Government Printing Office. 135 pp.

Features readings from the *Monthly Labor Review* on problems of the workplace, quality of worklife, and joint labor-management productivity projects. (See also individual entries under Grahm L. Staines, Robert P. Quinn, Stephen H. Fuiler, Irving Bluestone, and Barry A. Macy.)

Effects of productivity change

12.1 Abrahamsson, Bernhard J., ed. *Conservation and the Changing Direction of Economic Growth.* Boulder, Colo., Westview Press, 1978. 151 pp.

A collection of essays exploring the implications of energy shortages for conservation and economic growth. The authors generally argue for flexibility of resource allocation to ensure continued growth in the West.

12.2 Allen, Edward L. *Energy and Economic Growth in the United States.* Cambridge, Mass., MIT Press, 1979. 206 pp.

Based on certain assumptions about investment, productivity, population growth, and other variables, the author estimates economic growth and energy demand to the year 2000.

12.3 Berndt, E. and Khaled, M.S. "Parametric Productivity Measurement and Choice among Flexible Functional Forms." *Journal of Political Economy*, December 1979, pp. 1220–1245.

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The authors formulate a model of producer behavior for U.S. manufacturing that identifies substitution elasticities, scale economies, and the rate and bias of technological change. They find substantial economies of scale and relatively little technological change.

12.4 Boyer, J.S. "Plant Productivity and Environment." *Science*, October 29, 1982, pp. 443–448.

Holds that larger yields are possible if plants are better adapted to their environments. Finds that high productivity occurs through such adaptation, and discusses advances in science which facilitate exploration of adaptive mechanisms.

12.5 Campbell, Robert W. *Soviet Energy Technologies: Planning, Policy Research, and Development.* Bloomington, Indiana University Press, 1980. 268 pp.

Examines Soviet capabilities and efforts to innovate in the energy sector. Rejects the belief that the Soviet Union is a cheap-energy producer. Finds innovation decisions to be made at high levels, with weaknesses in feedback from lower levels.

12.6 Caves, D.W., and others. "Productivity Growth, Scale Economies, and Capacity Utilization in U.S. Railroads, 1955–74." *American Economic Review*, December 1981, pp. 994–1002.

The authors develop estimates of productivity growth free of changes in scale and movements toward or away from equilibrium. They base their estimates of productivity growth on cost data.

12.7 Crandall, Robert W. "Pollution Controls and Productivity Growth in Basic Industries." *Productivity Measurement in Regulated Industries.* Thomas G. Cowing and Rodney S. Stevenson, eds. New York, Academic Press, 1981, pp. 347–368.

Defines the politics and technology of pollution controls, examines engineering standards, and the bias of controls against capital-intensive and rapidly growing industries. Finds that productivity in pollution-control-affected industries has declined more sharply than in others.

12.8 Deutsch, Michael J. "Real Energy Prices and Future Economic Growth." In *Energy and Materials: A Shortage of Resources or Commitment? Special Study on Economic Change*, Vol. 2, Joint Economic Committee, U.S. Congress, December 28, 1980. Washington, U.S. Government Printing Office, pp. 34–86.

Discusses short- and long-run effects of energy prices on economic growth, productivity and competitiveness, changes in energy usage and inputs, and related topics. He argues that the long-range out look for the economy is bleak.

12.9 Dorr, Edward E. *Economies of Scale in High School Construction and Operation.* Doctoral dissertation presented to North Carolina State University, 1979. 132 pp.

Investigates the sources of economies of scale. Points to certain areas of physical plant as chief sources of per-pupil cost reduction, partly because they are susceptible of community use. Finds economies of scale to be optimal when capacity is raised from 500 to 1,000 students, but a loss in scale economies above 1,500-student capacity.

12.10 Gelb, Bernard A. and Pliskin, Jeffrey. *Energy Use in Mining: Patterns and Prospects.* Conference Board Study. Cambridge, Mass., Harper & Row, Ballinger, 1979. 215 pp.

The authors study trends in energy use and project demand through 1985. They argue that increases in energy per unit of output have resulted from changes in product mix, technological changes, and resource constraints.

12.11 Goodwin, Craufurd D., ed. *Energy Policy in Perspective: Today's Problems, Yesterday's Solutions.* Washington, The Brookings Institution, 1981. 728 pp.

A collection of papers dealing with approaches to energy problems under various U.S. administrations and prospects ahead.

12.12 Greene, Richard. "Employment Trends in Energy Extraction." *Monthly Labor Review*, May 1981, pp. 3–8.

Analyzes the employment effect of the rapid expansion of American extraction industries following the 1973–74 oil embargo. Reviews trends in oil and natural gas and coal mining industries, as well as in the equipment

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industries related to them. Describes trends by state.

12.13 Hall, B.F. and LeVeen, E.P. "Farm Size and Economic Efficiency: The Case of California." *American Journal of Agricultural Economics*, November 1978, pp. 589–600.

The authors examine the sources of farm efficiency and the important of factors other than labor-saving technology. They find that moderate-size farms can achieve a major portion of cost savings associated with size, and that enforcement of a 160-acre limit would result in only a small efficiency loss.

12.14 Hannon, Bruce and Brodrick, James R. "Steel Recycling and Energy Conservation." *Science*, April 30, 1982, pp. 485–491.

The authors, after examining the potential of steel recycling on energy use, find it to be uneconomical because of volatile steel scrap prices. They discuss energy-saving steelmaking technologies, but argue that energy will ultimately be saved by reduced use of steel, as rising energy costs are passed on.

12.15 Hitch, Charles J., ed. *Energy Conservation and Economic Growth*. Boulder, Colo., Westview Press, 1978. 167 pp.

Research papers examining conservation responses to energy scarcity and higher prices, technology combining energy saving and growth, the relation of energy to employment, and the relation between energy and economic growth rates.

12.16 Jorgenson, Dale W. "Energy Prices and Productivity." In Jerome M. Rosow, ed. *Productivity: Prospects for Growth*. New York, Van Nostrand Reinhold, 1981, pp. 35–53.

Argues that the retardation in output growth in the mid 1970's was linked to slowed productivity growth. Analyzes causes of the slowdown at the sectoral level, finding it to be associated with higher prices for capital inputs in a large proportion of industries, tracing the higher prices to rising energy costs.

12.17 Kakela, Peter J. "Iron Ore: From Depletion to Abundance." *Science*, April 10, 1981, pp. 132–136.

Traces policies growing out of iron ore scarcity during World War II and after. Discusses the emergence of taconite and the tax and other policies surrounding it. Shows how taconite eliminated the threat of iron ore depletion.

12.18 Kannan, Narasimhan P. *Energy, Economic Growth, and Equity in the United States*. Baltimore, Johns Hopkins University Press, 1980. 463 pp.

Estimates the potential tradeoff between energy self-sufficiency and economic growth. Hypothesizes on the social conflict over distributive shares. Finds the efficacy of a free-market solution to be limited to short-term horizons. Recommends conservation policies and policies favoring a more labor-intensive economy.

12.19 Keating, John J. *Estimates of Economies of Scale in Telecommunications*. Doctoral dissertation presented to Temple University, 1979. 185 pp.

Estimates the degree to which the telecommunications industry is a natural monopoly by devising economy-of-scale calculations from a multiple output production model.

12.20 Kikuchi, M. and Hayami, Y. "Agricultural Growth Against a Land Resource Constraint: A Comparative History of Japan, Taiwan, Korea and the Philippines." *Journal of Economic History*, December 1978, pp. 839–864.

The authors show a shift, common to all four countries, from extensive to intensive agriculture. They find that intensification of agriculture was conditioned by infrastructure improvements, such as irrigation and drainage. They discuss inducements to higher public investment in such infrastructure.

12.21 Kutscher, Ronald E. "The Influence of Energy on Industry Output and Employment." *Monthly Labor Review*, December 1979, pp. 3–10.

Examines output and employment trends in energy-producing industries, 1958–77, emphasizing 1973–77. Compares high and low energy-and capital-intensive, industries. Finds employment growth in the less energy-intensive industries to have outpaced the more energy-intensive industries.

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12.22 Laumas, Prem S. and Williams Martin. "Energy and Economic Development." *Welwirtschaftliches Archiv*, 1981, pp. 706–716.

The authors hold that shortages of energy did not account for lack of recent industrial progress in less developed countries. Citing India, they discuss the ample availability of domestic energy sources and the substitutability of fuels in many industries.

12.23 de Leeuw, F. "Why Capacity Utilization Estimates Differ." *Survey of Current Business*, May 1979, pp. 45–56.

Compares estimates from surveys to those based on output statistics. Finds survey-based estimates to result in less fluctuating capacity measures. However, these are flawed by over-reporting of "no change" and the use of labor inputs instead of outputs in measuring utilization.

12.24 Litterman, Mary Ann. *Energy Substitution in U.S. Manufacturing and Agriculture.* Doctoral dissertation submitted to the University of Minnesota, 1980. 406 pp.

Investigates the relation between energy capital, and labor, and intermediate materials in 20 manufacturing industries 1947–76.

12.25 McBride, Mark E. "The Nature and Source of Economies of Scale in Cement Production." *Southern Economic Journal*, 1981, pp. 105–115.

Develops and estimates a model of cement production. Finds that labor and capital both exhibit economies of scale that vary by type of plant.

12.26 Magnus, J.R. "Substitution Between Energy and Non-Energy Inputs in the Netherlands, 1950–76" *International Economic Review*, June 1979, pp. 465–484.

The author finds that labor and energy are close substitute, energy and capital are highly complementary, and labor and capital are only slightly substitutable.

12.27 Maia, Maria M. *Dimension and Causes of Inefficiency in Brazilian Agriculture.* Doctoral dissertation presented to Vanderbilt University, 1979. 206 pp.

Argues that Brazilian agriculture is inefficient by most quantitative standards, and that its ability to maintain adequate food supply results from increasing the cultivated lands area rather than output per acre. Finds inefficiency to result from size of farm, sharecropping, urban development, demographic density, subsidized credit, and other factors.

12.28 Norlund, Willis J. and Thayne, Robert R. *Energy and Employment.* New York, Praeger, 1980. 127 pp.

The authors examine energy as a factor in production and consumption. They focus on employment in the energy-producing industries and discuss the employment effects of alternative energy technologies.

12.29 Norsworthy, J.R. *Energy Prices, Technical Change, and Productivity Growth.* BLS Working Paper 118, April 1981. 22 pp.

Separates technical change into several components influencing factor proportions. Measures the effect of a number of factors that influence technical change. Also examines the effects of several variables on input factor usage, (productivity growth), including technical change, scale, and relative prices.

12.30 Olson, Kent D. *The Resource Structure of United States Agriculture: An Economic Analysis.* Doctoral dissertation presented to Iowa State University, 1979. 284 pp.

Estimates the structural coefficients of farmers' demand for resources, and offers resource projections to 1990. Analyzes factors affecting demand including machinery, buildings and land improvement, labor, and operating inputs.

12.31 Pindyck, Robert S. *The Production and Pricing of Energy Resources. Advances in the Economics of Energy and Resources.* Greenwich, Conn., JAI Press, 1979. 250 pp.

A collection of papers discussing, among other topics, the production and pricing of exhaustible resources, optimal exploitation, the forecasting of discovery rates, and various theoretical issues.

12.32 Popp, Manfred, "German Energy Technology Prospects." *Science*, December 24, 1982, pp. 1280–1285.

Discusses efforts needed to continue the advantageous development of nuclear power, especially fuel and advanced reactors. Holds

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that for nonnuclear energy, economics is the chief limiting factor, which additional research in technologies appears unlikely to overcome, given current energy costs.

12.33 Ridker, Ronald G. and Watson, William D. *To Choose A Future: Resource and Environmental Consequences of Alternative Growth Paths.* Baltimore, The Johns Hopkins University Press, 1980. 463 pp.

The authors discuss the resource, environmental, and related economic problems the United States may face during the next 50 years. They discuss labor productivity, energy, agriculture, nonfuel minerals, and various aspects of the national economy.

12.34 Sant, Roger W. "Energy Productivity: Its Role in the Growth of the American Economy." In *Dimensions of Productivity Research. Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 183–190.

Defines energy productivity. Differentiates between energy services and energy supplies and discusses comparative costs.

12.35 Saunders, Harry D. *Energy-Economy Interactions. Oil and the World Economy.* Doctoral dissertation submitted to Stanford University, 1982. 227 pp.

Links short- and long-run factors affecting oil and the world economy by formulating factor use and output characteristics of capital stock. Finds long-run energy-economy linkages to be weak and shorter-run linkages to be volatile.

12.36 Simon, Julian L. *The Ultimate Resource.* Princeton, Princeton University Press, 1981. 415 pp.

Challenges conventional views about population growth and the scarcity of food and natural resources. Presents a historical analysis of the relation between population and resources, finding long-term trends to favor population growth. Believes in man's ability to overcome shortages.

12.37 Slesser, Malcolm. *Energy in the Economy.* New York, St. Martin's Press, 1978. 164 pp.

Discusses the relation between energy and economic growth, fuel substitution, and energy statistics.

12.38 Spencer, Dwain F., and others. "Coal Gasification for Electric Power Generation." *Science,* March 26, 1982, pp. 1571–1576.

The authors argue that integrated coal gasification power plants are competitive with commercial coal-fired plants. They discuss the current status of gasification technology and analyze environmental effects and power plant reliability.

12.39 Tatom, John A. "Investment and the New Energy Regime." In *Public Policy and Capital Formation.* Washington, Board of Governors of the Federal Reserve System, April 1981, pp. 221–232.

Examines the future impact on investment of past changes in energy prices, and argues that a capital shortage exists due to the rise in those prices.

12.40 Tejada-Bailly, Miguel L. *Energy and Economic Growth in a Developing Country: The Case of Peru to the Year 2000.* Doctoral dissertation submitted to Iowa State University, 1981, 253 pp.

Estimates energy demands suitable to the characterists of Peru. Derives key inputs and intermediate factors. Outlines policy implications.

12.41 Thompson, William F., and others. *Choice over Chance: Economic and Energy Options for the Future.* New York, Praeger, 1981. 279 pp.

The authors analyze the future economic growth and energy prospects for the United States. They review the dominant factors that have impinged on economic growth and energy over the previous 30 years. They recommend increased domestic investment, new technology, aligning regulatory processes with productivity advance, and other measures to increase economic vitality and energy security.

12.42 Tsuru, Shigeto., ed. *Economic Growth and Resources: Problems Related to Japan. Proceedings of Session VI of the Fifth Congress of the International Economic Association,* held in

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Tokyo, Japan. Vol. 5. London, Macmillan, 1980. 412 pp.

A collection of research papers dealing with comparative analysis of economic growth and industrial organization, environmental and resource constraints in Japan, and ocean resources. Papers also discuss the acceleration in the growth of real product and productivity in Japan up to the 1960's.

12.43 Tsuru, Shigeto, ed. *Growth and Resources Problems Related to Japan.* Tokyo, Japan, Asahi Evening News, 1978. 412 pp.

A collection of research papers discussing such topics as economic growth, growth accounting, resource constraints, and social indicator approaches to economic development.

12.44 Walton, Amy L. *Energy Prices, Investment, and Economic Growth in the Middle Atlantic Region.* Doctoral dissertation presented to Princeton University, 1979. 184 pp.

Formulates an econometric model adapted to regional analysis. Estimates inputs for capital, labor, electric and fossil fuel energy, and intermediate materials, and calculates substitution elasticities. Finds these elasticities to differ widely across regions and industries, but to be comparatively narrow for the Middle Atlantic Region because of older capital stock.

12.45 Watson, William F. *Energy Use in United States Manufacturing: The Case for the Nonseparability of Inputs.* Doctoral dissertation submitted to North Carolina State University at Raleigh, 1981. 128 pp.

Argues the separability of such energy sources as coal, gas, and oil, provided capital and labor do not affect the substitution properties among them.

12.46 Williams, Martin and Laumas, Prem S. "The Relation Between Energy and Nonenergy Inputs in India's Manufacturing Industries." *Journal of Industrial Economics,* December 1981, pp. 113–122.

The authors examine substitution possibilities, finding that for most industries materials and capital are fairly good substitutes for energy. They also argue that the Cobb-Douglas production technology model cannot adequately describe Indian manufacturing.

12.47 Wilson, Carroll L. *Coal—Bridge to the Future: Report of the World Coal Study,* Vol. 1. Cambridge, Mass., Harper & Row, Ballinger, 1980. 247 pp.

Discusses the need for coal and the issues affecting the expansion of its output. Argues the high proportion of energy requirements that coal must fill.

12.48 Woolf, Arthur G. *Energy and Technology in American Manufacturing, 1900–1929.* Doctoral dissertation submitted to the University of Wisconsin-Madison, 1980. 239 pp.

Notes the sharp decline in energy costs during 1900–29, as well as the shift from decentralized sources of power, water and coal, to centralized electrical power. Examines the transition, and the reasons for the adoption of electrical power. Finds technical changes generated by the shift to have been capital-using and labor saving.

Prices and costs

13.1 Bruno, Michael. *Raw Materials, Profits, and the Productivity Slowdown.* Working Paper No. 66OR. Cambridge, Mass., National Bureau of Economic Research, 1981. 41 pp.

Argues that the productivity slowdown was caused by higher raw material prices in general, not only higher energy costs, and that reduced materials inputs per unit of labor directly reduced output per unit of labor. Also shows that as profitability declined, capital investment was reduced.

13.2 Clark, Peter K. "Inflation and the Productivity Decline." *American Economic Review,* May 1982, pp. 149–154.

Shows a relationship between inflation and the productivity slowdown of the 1970's with inflation creating a downward bias in the measurement of real output while producing a fictitious reduction in productivity growth. Higher energy costs led to more labor-intensive means of production as inflation eroded tax deductions for depreciation, thus raising the rental price of capital services.

13.3 Comptroller General of the U.S. *The Council on Wage and Price Stability has not Stressed Productivity in Its Efforts to Reduce Inflation.*

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Washington, U.S. General Accounting Office, October 16, 1980. 38 pp.

Offers a critique of the Council's efforts in tying inflation to productivity, together with recommendations.

13.4 Costrell, Robert M. "Overhead Labor and the Cyclical Behavior of Productivity and Real Wages." *Journal of Post-Keynesian Economics*, Winter 1981–82, pp. 277–290.

Addresses the difficulty of reconciling short-run marginal productivity theory of real wages and employment with the evidence on the cyclical behavior of productivity. Concludes that the short-run theory should be abandoned.

13.5 Elrod, Norman R. *Factor Prices, Productivities, Unit Costs, and Price/Cost Ratios: An Examination of Wesley C. Mitchell's Business Cycle Theory Expanded to Include Labor, Capital, and Total Factor Estimates for the Postwar Period, 1947–76.* Doctoral dissertation submitted to George Washington University, 1981. 302 pp.

Deals with the price-cost-profit theme of Wesley C. Mitchell's business cycle theory, but expands the analysis to include other factors. Traces the course of labor productivity and unit labor costs over the cycle, and analyzes underlying factors.

13.6 Freund, William C. and Manchester, Paul B. "Productivity and Inflation." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research*, The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 53–75.

The authors postulate that changes in productivity can have "multiplier" effects on changes in inflation rates over time. They demonstrate these effects by way of a multiplier model and discuss policy implications.

13.7 Gordon, Myron J. "Corporate Bureaucracy, Productivity Gain, and Distribution of Revenue in U.S. Manufacturing, 1947–77." *Journal of Post-Keynesian Economics*, Summer 1982, pp. 483–496.

Examines the postwar distribution of revenue among various production costs and costs of entrepreneurial activity. Finds that the revenue share absorbed by entrepreneurial costs strongly rose over the period, absorbing all of the output from productivity gains. Also finds that the real wage rate rose from the fall in the real price of raw materials.

13.8 Gordon, Robert J. "The Consumer Price Index: Measuring Inflation and Causing It." *The Public Interest*, Spring 1981, pp. 112–134.

Argues that the Consumer Price Index (CPI) overstates inflationary trends. Compares the CPI with trends in the personal consumption expenditure deflator.

13.9 Gordon, Robert J. *Energy Efficiency, User Cost Change, and the Measurement of Durable Goods Prices.* Working Paper No. 408. Cambridge, Mass., National Bureau of Economic Research, November 1979. 81 pp.

Develops a theory of price measurement that ties differential increases in user values and production costs to quality improvement. Applies the theory to the commerical aircraft industry. Offer productivity estimates.

13.10 Hamermesh, Daniel S. *New Measures of Labor Cost: Implications for Demand Elasticities and Nominal Wage Growth.* Working Paper No. 821. Cambridge, Mass., National Bureau of Economic Research, Dec. 1981.

Develops quarterly measures of labor costs for 1953–78. Accounts for differences between hours paid and hours worked and other variables. Tests for responsiveness of nominal wage growth to inflation.

13.11 Howell, David R. *Production Technology, Job Skills, and Relative Industry Wages: A Study of Production Worker Wages in U.S. Manufacturing Industries.* Doctoral dissertation submitted to the New School for Social Research, 1982. 199 pp.

Develops measures of worker skills and production technology. Finds widening wage differentials over the postwar period due largely to unionization and increased employment of women. Concludes that these two elements are more important for relative wage levels than worker-financed training.

13.12 Kane, Anthony R. *Cost Trends and Productivity Advances in the Federal-Aid Highway Construction Contracting Industry, 1959–1975.* Doctoral dissertation presented to

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George Washington University, 1979. 240 pp.

Analyzes the highway construction industry and the public works programs it carries out. Develops input cost series for materials, labor, and equipment, and output cost measures. Computes productivity measures. Finds wide variations in the factors of production by State.

13.13 Lee, Douglas L. "Productivity, Inflation, and Economic Growth." In *Productivity: The Foundation of Growth. Special Study on Economic Change*, Vol. 10. Joint Economic Committee, U.S. Congress, Washington, U.S. Government Printing Office, December 29, 1980. pp. 47–57.

Argues that the productivity slowdown is not clearly linked to inflation. However, the author holds that inflation raises the risk of a decline in long-term investment in plant and equipment, which tends to lower the capital-labor ratio and, hence, productivity.

13.14 Medoff, James L. and Abraham, Katherine G. "Are Those Paid More Really More Productive?" *Journal of Human Resources*, Spring 1981, pp. 186–216.

Using data about the managerial and professional personnel of a major corporation, the author finds that job performance is less important in explaining earnings differences than is experience.

13.15 Mincer, Jacob. *Union Effects: Wages, Turnover, and Training*. Working Paper No. 808. Cambridge, Mass., National Bureau of Economic Research, 1982.

Finds that union pressure on wages results in the hiring of more productive workers, reduced turnover rates, and less job training. Argues that union wages include a premium, and that, therefore, quit rates of union workers are lower than than nonunion workers.

13.16 Parker, Jeffrey A. *A Vintage Capacity Model of Production*. Doctoral dissertation submitted to Stanford University, 1981. 179 pp.

Hypothesizes that the demand for factors of production depends not only on current relative factor prices, but also on past prices whose effects are embodied in old, inflexible production units. Applies the hypothesis to regional data of electric utilities, finding that, while the employment of factors of production responds to changes in relative factor prices, the response is spread over many years.

13.17 Tate, Raymond G. *A Comparative Analysis of the Impact on Social Factors of Production Costs and Productivity in The Netherlands, Mexico and the United States*. Doctoral dissertation submitted to Pace University, 1981. 212 pp.

Constructing indexes of various cost factors, the author finds Dutch social benefits and labor costs to be higher than those in the United States while productivity is lower. At the same time, Mexican labor costs are lower than those in the United States but employee benefits account for a larger part of total compensation; absenteeism among Mexican workers is the lowest of all three countries.

13.18 Tatom, J.A. "The 'Problem' of Procyclical Real Wages and Productivity." *Journal of Political Economy*, April 1980, pp. 385–394.

Examines the apparent contradiction of diminishing returns to labor due to procyclical real wages and labor productivity. The author shows how this problem arises for the private business sector, taking into account cyclical patterns in factor employment.

13.19 Webb, Shwu-Eng H. *The Effect of the Hot-Boning Processing Technique on the Cost Structure and Distribution System of the U.S. Beef Industry*. Doctoral dissertation presented to the University of Arkansas, 1979. 196 pp.

Discusses the introduction of hot-boning as a measure of energy conservation. Estimates the dollar costs and energy requirements for 41 beef-market regions. Finds that most of the cost savings from hot-boning occur in distribution, as opposed to processing.

13.20 Weintraub, Sidney. *Our Stagflation Malaise: Ending Inflation and Unemployment. Westport, Conn., Greenwood Press, 1981. 214 pp.*

Argues the misaligment of money incomes and real output. Emphasizes low productivity growth, proposing a tax-based incomes policy keyed to productivity growth to make possible full employment and price stability.

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13.21 Wu, Chia-Sheng. *Productivity and Wage Structure in Taiwan's Manufacturing Sector, 1966–1979.* Doctoral dissertation submitted to the University of Utah, 1981, 232 pp.

Estimates the effect of productivity on output growth and explores the effect of productivity on interindustry wage structures, and whether the linkage will make for a favorable future economic growth rate. Finds that technological change was mainly labor-intensive during the period under review, and that wage dispersion narrowed.

Employment

14.1 Ball, Robert. "Employment Created by Construction Expenditures." *Monthly Labor Review,* December 1981, pp. 38–44.

Presents a summary of BLS studies on the onsite and offsite employment effects of construction expenditures. Discusses costs and their distribution between materials and supplies, wages and benefits, and overhead and profits. Analyzes trends in onsite labor.

14.2 Boyer, Robert and Petit, Pacal. "Employment and Productivity in the EEC." *Cambridge Journal of Economics,* March 1981, pp. 47–58.

The authors argue that manufacturing was responsible for economic growth during the postwar period in the EEC countries up to 1973. The subsequent slow-down in productivity, they contend, was largely related to slower manufacturing growth, as was the increase in unemployment.

14.3 Crane, Jane-Ring F. *Employment and Employee Compensation in the 1972 Input-Output Study.* Bureau of Economic Affairs Staff Paper No. 38. Springfield, Va., National Technical Information Service, 1982.

Presents employment-related data for 1972 comparable to the 85- and 496-industry level of detail, permitting estimates of the employment effects of changes in final demand, as well as of the effect of production workers on compensation and wages.

14.4 Critchlow, Robert V. and others. *The Impact of Technology on Labor in Five Industries.* Bulletin 2137. Department of Labor, U.S. Bureau of Labor Statistics, December 1978. Washington, U.S. Government Printing Office, 60 pp.

Covers printing and publishing, water transportation, copper ore mining, fabricated structural metal, and intercity trucking. In addition to discussing technological changes and their impact on labor requirements, the authors report on the extent and pace of diffusion of those changes, as well as on productivity, capital investment, underlying demand factors, and other forces of change.

14.5 Daly, Patricia A. "Agricultural Employment: Has the Decline Ended?" *Monthly Labor Review,* November 1981, pp. 11–17.

After examining the characteristics of farm workers, the author discusses past declines in the number of farmers and farm workers, hours of work, and other factors. Also deals with prospective trends in farm productivity.

14.6 Davis, Howard, "Employment Gains of Women by Industry, 1968–78." *Monthly Labor Reivew,* June 1980, pp. 3–9.

Analyzes employment growth patterns among women. Finds that women filled more than one half of all nonfarm jobs that opened during 1968–78 and that almost all of women's job gains occurred in service-producing industries. Also examines cyclical sensitivity of employment of women in manufacturing.

14.7 Denison, Edward F. "Is U.S. Growth Understated Because of the Growth of the Underground Economy? Employment Ratios Suggest Not." *The Review of Income and Wealth,* March 1982, pp. 1–17.

Argues that high employment-population ratios indicate that GNP growth has not been understated; that this also follows from employment surveys based on establishment and household reports. Shows why employment ratios are pertinent to GNP estimates derived from wage and salary payments which, in view of the high employment ratios are also unlikely to have been understated.

14.8 Dymmel, Michael D. "Technology in Telecommunications: Its Effect on Labor and Skills." *Monthly Labor Review,* January 1979, pp. 13–19.

Examines electronic switching systems, glass fiber transmission cables, the computer,

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and other communications technologies on employment and occupational structure. Discusses labor productivity and investment. Also notes likely future developments.

14.9 Early, Steve and Witt, Matt. "How European Unions Cope with New Technology." *Monthly Labor Review*. September 1982, pp. 36–38.

The authors describe legislative and collective-bargaining measures by which European unions seek to protect jobs without impairing technological advance. They discuss reduction in work hours, consultation over the type and speed of labor-saving installations, work-sharing assignments, retraining, and other job protection measures.

14.10 Fain, Scott T. "Self-Employed Americans: Their Number Has Increased." *Monthly Labor Review*. November 1980, pp. 3–8.

Describes changing characteristics of the self-employed for the 1972–79 period. Discusses pertinent demographic trends, comparing the self-employed with wage and salary workers and unpaid family workers. Presents occupational and industry breakdowns, showing most of the self-employed to be engaged in service industries.

14.11 Falwell, Gary E. and others. *Technology and Labor in Five Industries*. Bulletin 2033. Department of Labor, U.S. Bureau of Labor Statistics, 1979. Washington, U.S. Government Printing Office. 50 pp.

Covers bakery products, concrete, air transportation, telephone communications, and insurance. In addition to discussing technological change and its impact on labor requirements, the authors report on the extent of diffusion, as well as productivity, capital investment, and underlying demand.

14.12 Falwell, Gary E. and others. *Technology and Labor in Four Industries*. Bulletin 2104. Department of Labor, U.S. Bureau of Labor Statistics, January 1982. Washington, U.S. Government Printing Office. 46 pp.

Covers meat products, foundries, metalworking industries, and electrical and electronic equipment. In addition to discussing technological change and its impact upon labor requirements, the authors report on the extent and pace of diffusion, as well as on productivity, capital investment, underlying demand factors, and other forces of change.

14.13 Forde, Errol A. *Labor Absorption in the Service Sector of a Developing Economy: The Case of Puerto Rico*. Doctoral dissertation presented to the University of Illinois at Urbana-Champaign, 1979. 290 pp.

Examines economic development in Puerto Rico from 1950 to 1974. Discusses theories of service sector growth. Finds that economic development in Puerto Rico is at an early stage, and thus generates rapid growth in service employment.

14.14 Freeman, Christopher. "The Kondratiev Long Waves, Technical Change and Unemployment." In *Structural Determinants of Employment and Unemployment*. Vol. II. Paris, Organization for Economic Cooperation and Development, 1979, pp. 181–196.

Argues that higher levels of unemployment are likely to persist in the 1980's for reasons associated with current patterns of technological change. Discusses process innovation and product innovation, stressing recent discontinuities in employment-absorbing product innovation. Cites examples from the electronics field.

14.15 Freeman, Christopher and others. *Unemployment and Technical Innovation: A Study of Long Waves and Economic Development*. Westport, Conn., Greenwood Press, 1982. 214 pp.

The authors analyze long-term structural and technical change and its relation to economic growth. They urge technology policies to combat unemployment and inflation and to promote growth.

14.16 Freeman, Richard B. "The Evolution of the American Labor Market, 1948–80." In *The American Economy in Transition*. Martin Feldstein, ed. Chicago, The University of Chicago Press, 1980, pp. 349–396.

Discusses such major changes as the decreasing rate of growth of real wages and labor productivity; age, sex and educational attainment of the labor force; shifts in the demand and employment structure of labor; the declining proportion of workers in trade unions; altered wage structures; and changes

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in the rate and composition of unemployment, and its relation to wage inflation.

14.17 Froebel, Folker, and others. *The New International Division of Labor: Structural Unemployment in Industrialized Countries and Industrialization in Developing Countries.* New York, Cambridge University Press, 1980. 407 pp.

The authors examine the global reorganization of production which, they argue, follows from the increasing fragmentation of commodity output in accordance with the most profitable combination of labor and capital. They offer case studies of the German textile and garment industry, free production zones, and foreign manufacturing activities by Germans.

14.18 Fullerton, Howard N. "The 1995 Labor Force: A First Look." *Monthly Labor Review*, December 1980, pp. 11–21.

Presents projections indicating that women will account for two thirds of the growth in the labor force, and that the black labor force will grow at twice the rate of the white labor force. Stresses the likelihood that the labor force will be mostly in the prime working ages, hence experienced.

14.19 Gardner, John Arthur. *Skidding and Bumping: Cyclical Patterns of Quality Adjustment of Labor Input.* Doctoral dissertation presented to the University of Michigan, 1980. 363 pp.

Studies deterioration in job content resulting from bumping of workers or from workers' taking less well-paid jobs due to economic conditions. Finds skidding and bumping to be inversely related to aggregate employment growth, capacity utilization, and production growth, and directly related to aggregate unemployment.

14.20 U.S. General Accounting Office. *Advances in Automation Prompt Concern over Increased U.S. Unemployment.* Washington, May 25, 1982. 39 pp.

Discusses implications of automation for the number and nature of jobs and reasons for varying opinions on automation's job impact. Presents some information on workers displaced by automation and identifies U.S. Department of Labor forecasts of occupational changes.

14.21 Gonzalez, Nancie L. "The Organization of Work in China's Communes." *Science*, September 3, 1982, pp. 898–903.

Reports on shifts in responsibility for work results from collective bodies to individuals and households in farm communities and related nonfarm enterprises. Notes differences between the greater and lesser economically advanced areas. Also discusses relation between work assignments, results, and income.

14.22 Gottschalk, Peter T. "Employer-Initiated Job Terminations." *Southern Economic Journal*, July 1982, pp. 35–44.

Argues that there is a relation between wages and productivity of older workers in a firm that maximizes labor service flows. Finds that older workers may be involuntarily terminated before they reach their peak productivity years. However, the larger the turnover costs and the smaller the difference between the growth in wages and in productivity, the more likely will the worker be kept on beyond his or her productivity peak.

14.23 Grossman, Allyson Sherman. "Women in Domestic Work: Yesterday and Today." *Monthly Labor Review*, August 1980, pp. 17–21.

Traces the decline in the proportion of domestic workers among working women since 1870. Discusses underlying factors, such as alternative employment opportunities. Also analyzes employment of black as against white domestics, as well as educational and marital status.

14.24 Guichaqua, Andre and Majeres, Jean. "Agrarian stucture, technology, and employment: agricultural development in Chile, 1955–65." *International Labour Review*, September–October 1981, pp. 597–614.

The authors, assess the impact of structural and technological changes in agriculture on productivity and employment. They find that benefits did not spread to the mass of Chilean peasants.

14.25 van der Hoeven, Rolph, "Employment, Basic Needs, and Industrialization." *International Labour Review*, July–August 1980, pp. 438–453.

States that rising manufacturing output has not necessarily led to higher life expectancy,

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caloric consumption, literacy or lower infant mortality in developing countries. Examines reasons for this, which include too much use of capital-intensive technologies. Shows how certain structural changes promote industrialization and contribute to satisfying basic needs.

14.26 International Labour Organization. Advisory Committee on Salaried Employees and Professional Workers. "Report of the Subcommittee on the Effects of Technological and Structural Changes on the Employment and Working Conditions of Non-Manual Workers." In *United States Delegation Report. Eighth Session of the Advisory Committee on Salaried and Professional Workers,* January 13–22, 1981. Washington, U.S. Department of Labor, Bureau of International Labor Affairs, 10 pp.

Presents abstracts of discussions of representatives of employers, workers, and governments regarding the introduction and effects of technological change on employment, work content, work organization, and working conditions. Also presents discussion of such effects on health and safety.

14.27 Ishikawa, Shigeru. *Essays on Technology, Employment, and Institutions in Economic Development.* Tokyo, Japan, Kinokunyia Co., 1981. 466 pp.

Discusses the possibilities of labor absorption in agriculture, technological changes in agriculture; and aspects of appropriate agricultural technology in Japan.

14.28 Job, Barbara Cottman. "Employment and Pay trends in the Retail Trade Industry." *Monthly Labor Review,* March 1980, pp. 40–43.

In addition to earnings, the author discusses changes in retail trade employment, between 1968 and 1978, reasons for the extension in retail operating hours, the industry's reliance upon flexible work schedules, tenure, and turnover.

14.29 Knight, J.B. and Lenta, G. "Has Capitalism Underdeveloped the Labour Reserves of South Africa?" *Oxford Bulletin of Economics and Statistics,* August 1980, pp. 157–201.

The authors measure and explain production and income of labor drawn from labor reserves. They attempt to contrast and combine conventional economic analysis with political economy (i.e., making variables endogenous which are conventionally treated as exogenous).

14.30 Krichene, Noureddine. *Growth and Employment in Tunisian Manufacturing.* Doctoral dissertation submitted to the University of California, Los Angeles, 1980. 327 pp.

Finds that public manufacturing in Tunisia displayed higher productivity, wage rates, and capital per worker than private manufacturing. Estimates the sources of the gains in labor productivity, finding that fast growth in capital per worker was the major source in private manufacturing, while technical change was most important in public manufacturing.

14.31 Kutscher, Ronald E. and others. *Economic Projections to 1990.* Bulletin 2121. Department of Labor, U.S. Bureau of Labor Statistics, March 1982. Washington, U.S. Government Printing Office. 151 pp.

The authors discuss projections of employment and output together with major assumptions. They evaluate previous projections and present pertinent data.

14.32 Leon, Carol Boyd. "Employed but not at Work: A Review of Unpaid Absences." *Monthly Labor Review,* November 1981, pp. 18–22.

Notes that absenteeism has risen more rapidly than employment since 1950, owing chiefly to vacations. Analyzes the relation between absences and employment by sex, industry, and pay status.

14.33 Leon, Carol Boyd. "The Employment-Population Ratio: Its Value in Labor Force Analysis." *Monthly Labor Review,* February 1981, pp. 36–45.

Demonstrates the use of the employment-population ratio in secular and cyclical analysis, and for inter-area comparisons. Also describes differences over time between the ratio, the employment level, labor force participation, and unemployment. Presents breakdowns by age and sex.

14.34 Leontief, Wassily W. "The Distribution of Work and Income." *Scientific American,* September 1982, pp. 188–204.

Argues for the displacement of human labor by technology, particularly solid state elec-

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tronics, which permits machines to take over the function of the human nervous system. Urges the shortening of work hours so as to share work and assure income to workers displaced by technology.

14.35 Lewis, F.D. "Explaining the Shift of Labor from Agriculture to Industry in the United States, 1869–1899." *Journal of Economic History*, September 1979, pp. 681–698.

Discusses the effects of productivity growth and land supply in agriculture and industry during the review period. Finds agricultural productivity and land supply to be the force underlying the decline in the proportion of agricultural workers.

14.36 Marwick, E. David. *Labor Separations Data: Sources and Uses.* Doctoral dissertation submitted to George Washington University, 1981.207 pp.

Investigates aspects of layoffs, discharges, and other types of separations of major groups of workers. Describes the characteristics of the data. Examines separations of office workers, as well as of blue-collar workers. Also explores the effect of temporary help services upon the data.

14.37 McCombie, John S.L. "On the Quantitative Importance of Kaldor's Law." *Bulletin of Economic Research*, November 1980, pp. 102–112.

Quantifies the contribution of the intersectoral transfer of labor to the growth of total productivity in the advanced countries. Finds that such transfers account for 12 to 48 percent of productivity growth, depending on the country examined.

14.38 National Commission for Employment Policy. *The Work Revolution. Eighth Annual Report.* Washington, December 1982. 28 pp.

Discusses changes in the labor force, including geographical shifts to the South; past and prospective changes in industries and occupations; the role of robots, and the significance of "the information age;" productivity; and the role of government.

14.39 Pearse, Andrew. *Seeds of Plenty, Seeds of Want.* Oxford, Oxford University Press, 1980. 262 pp.

The author discusses the socio-economic effects of the "Green Revolution," and the tension between these effects and the strides made in raising agricultural productivity. Notes especially the decline in the need for labor consequent upon the adoption of new technologies and the possibly worsening situation of the rural poor.

14.40 Perloff, Jeffrey M. and Wachter, Michael L. "The Productivity Slowdown: A Labor Problem?" In *The Decline in Productivity Growth.* Proceedings of a conference. Boston, Federal Reserve Bank, June 1980, pp. 115–146.

The authors discuss the effect of demographic shifts and cyclical fluctuations on the productivity slowdown, as well as labor market policies designed to ameliorate the slowdown.

14.41 Personnick, Valerie A. "Industry Output and Employment: BLS Projections to 1990." *Monthly Labor Review*, April 1979, pp. 3–14.

Discusses projections, and presents relevant data, in terms of the major components of the national product, as well as of individual industries. Notes such underlying forces as productivity advance and capital investment.

14.42 Personnick, Valerie A. "The Outlook for Industry Output and Employment Through 1990." *Monthly Labor Review*, August 1981, pp. 28–41.

Presents projects and describes the assumed characteristics of the economy in 1990. Discusses trends in employment and final demand.

14.43 Plant, Robert. *Industries in Trouble.* Geneva, International Labour Office, 1981.

Deals with structural unemployment and its major industrial source. Discusses problems in such industries as textiles and clothing, shoes, steel, shipbuilding, and electronics. Analyzes the effect of international division of labor and offers policy proposals.

14.44 Plewes, Thomas J. "Better Measues of Service Employment, Goal of Bureau Survey Redesign. "*Monthly Labor Review*, November 1982, pp. 7–16.

Presents a historical summary of trends in service employment, and reviews data

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sources, as well as the uses of the data for such statistical programs as productivity measurement. Discusses problems of measuring service employment. Examines the validity of certain assumptions built into survey procedures, and the departure from these assumptions in service businesses. Also surveys data collection problems.

14.45 Premus, Robert. *Location of High Technology Firms and Regional Economic Development.* A Staff Study Prepared for the Use of the Subcommittee on Monetary and Fiscal Policy of the Joint Economic Committeee, U.S. Congress, June 1, 1982. Washington, U.S. Government Printing Office. 70 pp.

Analyzes the relation between high technology industries and job growth. Presents comparisons by state. Discusses determinants of high technology plant location decisions and policy implications, such as those for education and training.

14.46 Riche, Richard W. "Impact of New Electronic Technology." *Monthly Labor Review,* March 1982, pp. 37–39.

Discusses prospects for diffusion and possible job impacts of microelectronics, industrial robots, telecommunications, and office automation. Argues that technological advance is generally beneficial, provided there is economic growth. Notes factors promoting or retarding such advance, changes in job content, and in occupational requirements.

14.47 Roberts, Markley. "The Workers' Stake in Adjustments to Technological Change." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research,* The American Productivity Center, Houston, Texas, April 21–24, 1980, pp. 467–473.

Discusses benefits of changing technology but stresses destructive effects on workers and their jobs, such as displacement, and loss of jobs and income. Notes the role of collective bargaining, and suggests steps to ease the human cost of innovation. Presents case studies on labor-management negotiated adjustments to technological change.

14.48 Rogers, Joe O'Neal. *The Impact of Economic Theory on Public Policy: The Case of Technological Change and Employment Policy.* Doctoral dissertation presented to Duke University, 1978. 289 pp.

Examines the Employment Act of 1946, the Area Redevelopment Act of 1961, and the Manpower Development and Training Act of 1962 for the influence of economic theories upon them. Finds that economists exerted great influence on this legislation. Also finds that economists emphasized technological change as a stimulus to investment.

14.49 Rones, Philip L. "Response to Recession: Reduce Hours or Jobs?" *Monthly Labor Review,* October 1981, pp. 3–11.

Discusses the timing and relative importance of workweek and employment cutbacks in durables manufacturing during six major business contractions. Compares cost and benefits of each of these responses to lower production.

14.50 Rosenthal, Neal H. "Shortages of Machinists: An Evaluation of the Information." *Monthly Labor Review,* July 1982, pp. 31–36.

Examines employment, unemployment, and earnings in a number of machine occupations, from 1972 to 1980. Presents projections to 1990.

14.51 Ryscavage, Paul M. "BLS Labor Force Projections: A Review of Methods and Results." *Monthly Labor Review,* April 1979, pp. 15–22.

Compares BLS projections made between 1959 and 1976 with actual results, showing them to be low for women, high for men. Discusses projection methodologies.

14.52 Schmid, Gregory. "Productivity and Reindustrialization: A Dissenting View." *Challenge,* January–February 1981, pp. 24–29.

Argues that the productivity slowdown of the 1970's was due chiefly to cheap labor relative to capital, as the labor force grew at unusually high rates. Disaggregates export data, finding no serious competitive disadvantages for advanced technological products.

14.53 Sekscenski, Edward S. "The Health Services Industry: A Decade of Expansion." *Monthly Labor Review,* May 1981, pp. 9–16.

Analyzes the employment impact of expansion in health services in the 1970's. Presents

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data by industry segment (such as hospitals and physicians' offices), and occupation. Also discusses earnings and hours, as well as the problem of absences.

14.54 Sinclair, P.J.N. "When will Technical Progress Destroy Jobs?" *Oxford Economic Papers*, March 1981, pp. 1–18.

Discusses the behavior of wages in the presence of technical change and how such behavior influences employment and unemployment.

14.55 Solomon, Lewis C., and others. *Underemployment of Ph.D.'s*. Lexington, Mass., Heath, 1981.

The authors survey current and future needs for Ph.d.'s in public-sector and other nonacademic employment. They predict job scarcities for holder of the doctoral degree but doubt that market adjustment will solve the underemployment problem, as a partial solution they recommend incentives to stimulate R & D.

14.56 Stahel, Walter R. and Reday-Mulvey, Genevieve. *Jobs for Tomorrow. The Potential for Substituting Manpower for Energy*. New York Vantage Press, 1981. 116 pp.

The authors, focussing on the automobile and construction industries in France, find that reconditioning of products and components represents an optimal means of reducing energy consumption while creating new jobs. They argue that reconditioning is more labor-intensive than product manufacturing. They propose regular technological upgrading of goods intended for long-term use.

14.57 Stanback, Thomas M., Jr., and others. *Services: The New Economy*. Totowa, N.J., Littlefield, Adams, 1981. 156 pp.

The authors explore the transformation of the American economy from manufacturing to services, emphasizing the growth in non-profit services (e.g., in government). They discuss the diffusion of knowledge in the services, producer services, organization of service work, and other facets of services.

14.58 Stein, Herbert. "Why did Consumption not Reflect the Slackening of Productivity Trends?" In *Contemporary Economic Problems, 1979*. Washington, American Enterprise Institute for Public Policy Research, 1979, pp. 13–15.

Discusses the increase in the rate of change of the employment-population ratio between 1949–69 and 1969–79. Compares increases in per-capita and per-employee real product.

14.59 Stein, Robert L. "National Commission's Recommendations on Labor Force Statistics." *Monthly Labor Review*, April 1980, pp. 11–21.

After reviewing earlier studies, the author summarizes the major recommendations of the Levitan Commission and duscusses the pressures underlying them. He reports especially on the labor force, economic hardship, the BLS nonagricultural establishment survey, and local area unemployment statistics.

14.60 Suarez-Villa, Luis. *Regional Industrialization and the Development of Labor-Intensive Linkages in Brazilian Industry: The Case of Three Regions*. Doctoral dissertation submitted to Cornell University, 1981. 340 pp.

Argues that underemployment represents the most serious long-term problem faced by Brazil, tracing it to rapid population growth, increasing industrial capitalization, and other factors. Advocates the development of labor-intensive industries, and discusses their interrelations, as well as their link to broader development strategies.

14.61 Urquhart, Michael. "The Services Industry: Is It Recession-Proof?" *Monthly Labor Review*, October 1981, pp. 12–18.

Analyzes the cyclical sensitivity of the service industries, examining job growth since 1948. Presents comparisons with goods-producing industries. Finds the former to be relatively recession-proof, except in some cases. Notes improvement in overall employment stability since the late 1940's.

14.62 Utter, Carol M. "Labor Turnover in Manufacturing: The Survey in Retrospect." *Monthly Labor Review*, June 1982, pp. 15–17.

Discusses findings from the Bureau's labor turnover series, discontinued in 1980. Notes the uses of the series, particularly as a yardstick for plant performance. Discusses limitations and some alternative sources.

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14.63 Vickery, Mary L. and others. *Technological Change and Its Labor Impact in Five Energy Industries.* Bulletin 2005. Department of Labor, U.S. Bureau of Labor Statistics, 1979. Washington, U.S. Government Printing Office. 64 pp.

Covers coal mining, oil and gas extraction, petroleum refining, petroleum pipeline transportation, and electric and gas utilities. In addition to discussing technological changes and their implications for labor, the authors report on the extent and probable future pace of diffusion, as well as productivity, capital investment, underlying demand, and other factors.

14.64 Watanabe, Susumu. "Multinational enterprises, employment, and technology adaptation." *International Labour Review*, November-December 1981, pp. 677-692.

Argues that multinational enterprises can be a progressive force, but that their product and target market may be highly specialized, hence their employment-creating capacity should not be overestimated, nor the technological benefits. Discusses possible enhancing actions by host governments.

14.65 Wernick, Murray S. and McIntire, James L. "Employment and Labor Force Growth: Recent Trends and Future Prospects." In *Human Resources and Demographics: Characteristics of People and Policy. Special Study in Economic Change*, Vol. 1. Joint Economic Committee, U.S. Congress, Washington, U.S. Government Printing Office, pp. 101-152.

The authors discuss recent employment gains and changes in the structure of employment, as well as the impact of demographic and employment changes on the the economy. They also present projections of the labor force and employment.

14.66 Wool, Harold. *The Adequacy of Job Opportunities for Recent Science and Engineering Graduates.* Vol. V. Papers commissioned as background for *Science Indicators—1980.* Washington, National Science Foundation, 1980.

Papers discuss recent employment trends, unemployment, and utilization of science and engineering graduates.

14.67 Wool, Harold, "Coal Industry Resurgence Attracts Variety of New Workers." *Monthly Labor Review*, January 1981, pp. 3-8.

Finds that coal companies have no shortage of inexperienced applicants even in Western "coal boom" areas, and that favorable wages appear to be the major attraction for new miners, who are younger, more educated than other miners, and include a growing number of women.

14.68 Wright, G. "Cheap Labor and Southern Textiles Before 1880." *Journal of Economic History*, September 1979, pp. 655-680.

Finds that cheap labor did not prevail in the South prior to 1875 and that the level of wages alone did not explain its absence.

14.69 Zeisel, Rose and others. *Technology, Productivity, and Labor in the Bituminous Coal Industry, 1950-79.* Bulletin 2072. U.S. Department of Labor, Bureau of Labor Statistics, February 1981, Washington, U.S. Government Printing Office. 69 pp.

Appraises some of the major structural and technological changes in the industry. Presents charts together with analytical text discussing such subjects as productivity, production and consumption, employment, and characteristics of the workforce.

Economic growth

15.1 Adelman, Irma, ed. *Economic Growth and Resources. Proceedings of the Fifth World Congress of the International Economic Association* held in Tokyo, Japan, 1977. Vol. 4. *National and International Policies.* New York, St. Martin's Press, 1979. 192 pp.

A collection of papers treating such subjects as the relation between employment and productivity in the industrially advanced countries; the effect of acquisitiveness on economic growth; and the meaning of development theory.

15.2 Ahmad, Ismet. *Indonesian Agricultural Productivity and Its Relation to Development Strategy: A Value-Added Approach.* Doctoral dissertation submitted to the University of Florida, 1982. 173 pp.

Applies the concept of value-added in measuring productivity growth rates in Indo-

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nesian agriculture and in estimating output elasticities and technical change. Finds average annual growth in productivity to have been less than 1 percent between 1950 and 1978.

15.3 Arndt, Heinz W. *The Rise and Fall of Economic Growth: A Study in Contemporary Thought.* Melbourne, Longman Cheshire, 1978. 161 pp.

Traces the phases of economic growth and opposition to it. Shows how growth was intended to reconcile conflicting interests, and discusses some of the cultural factors underlying its demise as an idea.

15.4 Ashbrook, Arthur G. "China: Economic Modernization and Long-term Performance." In *China Under the Four Modernizations,* Part 1, Joint Economic Committee, U.S. Congress, August 13, 1982. Washington, U.S. Government Printing Office, pp. 99–118.

Discusses past patterns and prospects of growth in Chinese agriculture, industry, and foreign trade. Also analyzes problems of manpower in science and technology, as well as population trends and living standards.

15.5 Aziz, Sartaj. *Rural Development. Learning from China.* New York, Holmes & Meier, 1978. 201 pp.

Evaluates China's experience since 1949 and its relevance for other developing countries. Discusses the technical transformation of China's agriculture and the structure of communes. Examines the organization of the population appropriate to the given stage of development and technology.

15.6 Backman, Jules, ed. *Economic Growth or Stagnation: The Future of the U.S. Economy.* Indianapolis, Bobbs-Merrill, 1978. 156 pp.

A collection of papers discussing the relation of topics such as low population growth, high energy prices, capital shortages, the role of technology, and the significance of the shift to service industries to future growth.

15.7 Baer, Werner. *The Brazilian Economy: Its Growth and Development.* Columbus, Ohio, Grid, 1979. 239 pp.

Tracing the historical evolution of the Brazilian economy, the author examines the process, methods, and effects of industrialization. He also examines the institutional structure of the economy and its mix of private and state firms.

15.8 Balassa, Bela. *Development Strategies in Semi-Industrial Economies.* Baltimore, Johns Hopkins University Press, 1982. 394 pp.

A collection of papers dealing with subjects such as systems of incentives and their effects on resource allocation and economic growth. Papers also include case studies on Argentina, Israel, Korea, and others.

15.9 Balassa, Bela. *The Process of Industrial Development and Alternative Development Strategies: Essays in International Finance,* No. 141. Princeton, Princeton University Department of Economics, 1981. 34 pp.

Discusses the early stages of industrial development and the choice between inward-oriented and outward-oriented strategies. Concludes that during the postwar period, countries applying outward oriented strategies performed better than others in terms of employment and economic growth.

15.10 Barker, T.E. and others, eds. *Perspectives on Economic Development: Essays in Honor of Sir W. Arthur Lewis.* Washington, D.C., University Press of America, 1982. 304 pp.

A collection of papers dealing with topics such as Lewis' model of development with unlimited supplies of labor; industrialization and development in Latin America; technology transfer; and basic needs strategies and economic development.

15.11 Baum, Richard, ed. *China's Four Modernizations: The New Technological Revolution.* Boulder, Colo., Westview Press, 1980. 307 pp.

A collection of papers chiefly dealing with the acquisition, absorption, and assimilation of modern industrial technology in post-Maoist China.

15.12 Beckerman, Wilfred, ed. *Slow Growth in Britain: Causes and Consequences.* Oxford, Oxford University Press, 1979. 237 pp.

Papers dealing with topics such as the impact of slow growth on the labor market; the growth of the public sector; the slow growth of the world economy; and implications of energy shortages for Britain's growth.

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15.13 Berend, Ivan T. and Ranki, Gyorgy. *Underdevelopment and Economic Growth: Studies in Hungarian Economic and Social History.* Budapest, Akademiai Kiado, 1979. 259 pp.

A collection of essays, some of which consider the efforts to overcome underdevelopment through industrialization during the interwar period, as well as industrialization and socialist transformation since World War II.

15.14 Bernstein, Michael A. *Long-Term Economic Growth and the Problem of Recovery in American Manufacturing: A Study of the Great Depression in the United States, 1929–39.* Doctoral dissertation submitted to Yale University, 1982. 525 pp.

Examines growth rates of 12 major manufacturing industries to determine which were depression-proof and which were not. Investigates technological developments in addition to prices, costs, and other variables, finding that nondurable consumer goods weathered the Depression better than capital goods.

15.15 Berry, Leonard and Kates, Robert W., eds. *Making the Most of the Least: Alternate Ways of Development.* New York, Holmes and Meier, 1980. 282 pp.

A collection of papers dealing with a range of subjects affecting economic development, including noneconomic factors. The authors argue for nonexploitative relations between regions and between developing and developed countries.

15.16 Bhatt, V.V. *Development Perspectives. Problem, strategy and policies.* New York, Pergamon Press, 1980. 313 pp.

Explores the upgrading of traditional technologies and the adaptation of modern technologies to given situations, the improvement of agricultural organization and technology, and other subjects.

15.17 Bierstekker, Thomas J. *Distortion or Development: Contending Perspectives on the Multinational Corporation.* Cambridge, Mass., MIT Press, 1978. 199 pp.

Evaluates two approaches to the impact of multinational firms on economic development, considering the arguments of inappropriate technology and consumption patterns, the transfer of skills and knowledge to domestic employments, and others.

15.18 Bloomfield, A.I. "The Impact of Growth and Technology on Trade in Nineteenth Century British Thought." *History of Political Economy,* Winter 1978, pp. 608–635.

Examines relevant analyses of change in comparative advantage. Discusses the potential weakening of Britain's comparative advantage in manufactures, as well as debates on restricting of exports of British machinery.

15.19 Brown, Lester R. *The Global Economic Prospect: New Sources of Economic Stress.* Washington, Worldwatch Institute, 1978, 56 pp.

Considers the relation between the expanding global economy and the earth's natural systems. Argues that the world is running out of cheap energy, that returns to agriculture and fishing are diminishing, and capital shortages are intensifying. Argues for a shift in policies from growth to sustainability.

15.20 Buxton, Neil K. "Economic Growth in Scotland Between the Wars: The Role of Production Structure and Rationalization." *Economic History Review,* November 1980, pp. 538–555.

After describing the decline of the Scottish economy, the author explores supply-side reasons, showing that Scotland's industrial structure was unfavorable and not efficient or diversified enough.

15.21 Carreno Roman, E. *The Brazilian Model of Development.* Doctoral dissertation presented to Rutgers University, The State University of New Jersey, 1980, 330 pp.

Argues that government intervention in the economic development process is important, while neoclassical approaches are faulty. Shows that development occurs in stages and investigates the impact of government upon each stage. Stresses government's role in attracting investment and creating a domestic technology.

15.22 Chatterji, M. and Wickens, M.R. "Productivity, Factor Transfers, and Economic Growth in the U.K." *Economica,* February 1982, pp. 21–38.

The authors assess the extent to which transfers of labor and capital expenditures from the nonmanufacturing to the manufacturing sector raise the rate of economic growth.

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15.23 Chen, Edward, K.Y. *Hyper-Growth in Asian Economies: A Comparative Study of Hong Kong, Japan, Korea, Singapore and Taiwan.* New York, Holmes & Meier, 1979. 241 pp.

Noting that the countries discussed share the Chinese cultural tradition, a free enterprise environment, and an export promotion approach, the author examines the facts underlying their growth experience, including causes such as technical progress and trade expansion.

15.24 Chenery, Hollis. *Structural Change and Development Policy.* Oxford, Oxford University Press, 1979. 526 pp.

Discusses investment decisions, the relation between growth and poverty in developing countries, economies of scale and investment, optimal growth patterns, the process of industrialization, and other topics.

15.25 Choi, Kwang. *A Study of Comparative Rates of Economic Growth.* Doctoral dissertation presented to the University of Maryland, 1979. 392 pp.

Tests leading hypotheses concerning reasons for differences in growth rates. Focusses on Mancur Olson's theory that democratic countries with freedom of organization generate powerful common-interest groups whose effect is to lower growth rates.

15.26 Christensen, Laurits R., and others. "Economic Growth, 1947–73: An International Comparison." In Kendrick, John W. and Vaccara, Beatrice N., eds. *New Developments in Productivity Measurement and Analysis.* National Bureau of Economic Research, Studies in Income and Wealth, Vol. 44. Chicago, The University of Chicago Press, 1980, pp. 595–691.

The authors compare growth in real product and its sources, growth in real factor input, and growth in total factor productivity. They discuss their own as well as alternate methods of comparison.

15.27 Cochrane, Peter. *Industrialization and Dependence. Australia's Road to Economic Development, 1970–1939.* Lawrence, Mass., University of Queensland Press, 1980. 171 pp.

Examines reasons for Australia's economic development and why it escaped the underdevelopment syndrome. Argues that Australia remained dependent over the period studied, and her industrial development reflects changes in the pattern of dependence.

15.28 Colman, David and Nixson, Frederick. *Economics of Change in Less Developed Countries.* New York, Wiley, 1978. 309 pp.

The authors discuss concepts, measurement, and theories of economic development. They also discuss the relation of trade and agriculture to development, the problem of technology transfer, and other aspects of development.

15.29 Conkin, Paul. *Prophets of Prosperity. America's First Political Economists.* Bloomington, Indiana University Press, 1980. 333 pp.

Analyzes the thought of such major protagonists of economic growth as Henry Carey, Daniel Raymond, and John Taylor. Deals with ideas concerning a productive high-wage economy, immigration, rents, and tariff protection.

15.30 Cornwall, J. "Economic Growth: Two Paradigms." *Journal of Post-Keynesian Economics,* Spring 1979, pp. 69–90.

Compares neoclassical and post-Keynesian analyses of growth. Argues that post-Keynesian theory is analytically superior, since it accounts for growth processes which neoclassical theory cannot explain.

15.31 Daftary, Farhad, *Economic Development and Planning in Iran, 1955–1967.* Doctoral dissertation presented to the University of California, Berkeley, 1979. 558 pp.

Describes the structure and development of the Iranian economy. Examines the procedures and methods of economic planning, focussing on the actions to which planning presumably is a guide.

15.32 Deane, Phyllis. *The First Industrial Revolution.* London, Cambridge University Press, 1979. 318 pp.

Applies the concepts and techniques of development economics to British economic growth, 1750–1850. Finds that, compared with countries which had industralized later, Britian's gowth potential remained low.

15.33 Dernberger, Robert F., ed. *China's Development Experience in comparative Perspective.*

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Cambridge, Harvard University Press, 1980. 347 pp.

A collection of essays analyzing various aspects of China's economic development including income redistribution, the role of small enterprise, tax reform, and the role of central planning.

15.34 Dernberger, Robert F. "The Chinese Search for the Path of Self-Sustained Growth in the 1980's: An Assessment." In *China Under the Four Modernizations*, Part 1, Joint Economic Committee, U.S. Congress, August 13, 1982. Washington, U.S. Government Printing Office, pp. 19–76.

After reviewing industrial policies since 1978, the author discusses the inherited economic development model and its modification by the post-Mao Chinese leadership. He analyzes the reform of Maoist ideology, Stalinist strategies, and the Soviet model, and outlines future prospects.

15.35 Dike, Enwere. *Economic Growth, Capital Accumulation, and Technological Progress. Nigeria. 1960–78: A Study of the Pattern of Economic Transformation in a Post Colonial Formation.* Doctoral dissertation submitted to the University of Notre Dame, 1982. 335 pp.

Examines the transformation of the scale and origins of investment resources, and the role of the state in the accumulation process. Finds that Nigeria did not suffer from capital shortage so much as from neglect of the agricultural sector and from insufficient investment in capital goods, preventing the emergence of an indigenous technological infrastructure.

15.36 Diwan, Romesh K. and Livingston, Dennis. *Alternative Development Strategies and Appropriate Technology: Science Policy for an Equitable World Order.* New York, Pergamon Press, 1979. 256 pp.

Stressing the role of sophisticated science and technology in the existing inequality among nations, the authors argue the use of "soft" technologies by small groups and individuals to reduce inequality. They survey the growth policies pursued by advanced nations in the 1950's and 1960's, advocating alternative development strategies for the developing nations.

15.37 Dunn, Robert M. *Economic Growth Among Industrialized Countries: Why the United States Lags.* Washington, National Planning Association, 1980. 67 pp.

Analyzes causes of the recent productivity slowdown and slowed economic growth. Stresses role of savings and investment in the economic growth process, as well as R&D. Argues that the investment in plant and equipment is inadequate.

15.38 Ehrlich, Eva. "The Model of Japan's Closing-Up: Two-Pole Industrialization." *Acta Oeconomica*, 1979 23 (1–2), pp. 131–155.

Argues that Japanese industrialization occurred both at the level of large-scale industry and the village, and that the experience of other developing countries was thus integrated in Japan's own economic development.

15.39 Elias, V.J. "Sources of Economic Growth in Latin American Countries." *Review of Economics and Statistics*, August 1978, pp. 362–370.

Applies a growth-accounting approach. Presents estimates of the quality of labor and capital inputs as well as productivity estimates.

15.40 Fabricant, Solomon. *The Economic Growth of the United States: Perspective and Prospective.* Montreal, C.D. Howe Research Institute. Washington, National Planning Association, 1979. 88 pp.

Analyzes postwar developments in output and output per capita, labor productivity, and patterns of production. Also discusses prospective trends in population and labor force, productivity, and economic growth.

15.41 Field, Robert Michael. "Growth and Structural Change in Chinese Industry 1952–79." In *China Under the Four Modernizations*, Part 1, Joint Economic Committee, U.S. Congress, August 13, 1982. Washington, U.S. Government Printing Office, pp. 303–333.

Discusses the statistics of the Chinese energy, machinery, materials, and light industries. Analyzes the impact of price changes upon the growth of industry.

15.42 Findlay, R. "On W. Arthur Lewis's Contributions to Economics." *Scandinavian Journal of Economics*, 1980, pp. 62–79.

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Surveys Lewis' analyses of the evolution of the world economy, development economics modern economic growth, and other related fields.

15.43 Fishlow, Albert. "Brazilian Development in Long-Term Perspective." *American Economic Review*, May 1980, pp. 102–108.

Discusses the impact of war, depression, and accelerated inputs of capital and technology on Brazilian economic growth. Also deals with the reasons for the recent "miracle" of accelerated industrial expansion.

15.44 Fitzgerald, E.V.K. *The Political Economy of Peru, 1956–78: Economic Development and the Restructuring of Capital.* New York, Cambridge University Press, 1980. 360 pp.

Analyzes the shift in economic growth factors from the primary to the industrial sector, involving consequent shifts in input uses, technology, labor organization, and ownership patterns. Traces changes in income distribution. Argues that the new development model must be consistent in economic and political terms, but that such consistency was not attained in Peru. Discusses the reasons for this failure.

15.45 Friedman, Edward, ed. *Ascent and Decline in the World System: Political Economy of the World System.* Beverly Hills, Sage, 1982. 303 pp.

A collection of papers discussing reasons why third world countries are unable to grow. Papers also deal with the global division of labor, growth in Turkey and Taiwan, and the development experience of Hawaii.

15.46 Gallman, R.E. "Slavery and Southern Economic Growth." *Southern Economic Journal*, April 1979, pp. 1007–1022.

Investigates the level and rate of growth of Southern per capita income in the antebellum South. Also examines the impact of slavery on industrial structure and performance.

15.47 Gappert, Gary. *Post-Affluent America: The Social Economy of the Future.* New York, Franklin Watts, 1979. 242 pp.

Postulates slow growth and eventual "steady state" over the next half century, and outlines the social and economic issues that follow. Reviews possible policies dealing with work redesign and job satisfaction, as well as the role of government.

15.48 Giersch, H. "Aspects of Growth, Structural Change, and Employment—A Schumpeterian Perspective." *Weltwirtschaftliches Archiv*, 1979, pp. 629–52.

Argues that the income changes in the Western World are related to the economic recovery of Germany and Japan after World War II. Emphasizes supply factors such as human capital, entrepreneurship, capital movements, and technology transfers.

15.49 Giersch, Herbert, ed. *Towards an Explanation of Economic Growth. Symposium 1980.* Tuebingen, Germany, Mohr, 1981. 476 pp.

Research papers exploring alternative paths of economic growth in light of the slowdown of growth and productivity in the 1970's. The authors cover such topics as human resources and motivation, the rise of service employment, and innovation.

15.50 Gill, Mahinder S. *Determinations of Economic Growth in Peninsular Malaysia, 1960–76.* Doctoral dissertation submitted to the George Washington University, 1982. 402 pp.

Examines the extent to which monetary and fiscal policies, and governmental development strategies focussed on specific economic sectors. Investigates the relation between output and capital and labor inputs. Finds capital formation to have been a major determinant of growth, together with increases in public consumption.

15.51 Gordon, Lincoln. *Growth Policies and the International Order.* New York, McGraw-Hill, 1979. 183 pp.

Deals with the long-term structure of growth, particularly in industrial countries, and structural policies influencing the composition and location of economic activity. Examines factors affecting demand and supply, as well as resource limitations on economic growth.

15.52 Hacche, Graham. *The Theory of Economic Growth: An Introduction.* New York, St. Martin's Press, 1979. 349 pp.

Examines the emergence of growth theory with the Harrod-Domar models. Also dis-

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cusses neoclassical theory, Keynesian theory, and the history of economic growth.

15.53 Hamrin, Robert D. *Managing Growth in the 1980s: Toward a New Economics.* New York, Praeger, 1980. 295 pp.

Discusses factors governing future economic performance in the United States such as increases in resource costs and changing priorities. Argues for a normative approach to economic issues.

15.54 Hatiboglu, Zeyyat. *An Unconventional Analysis of Turkish Economy: An Essay on Economic Development.* Istanbul, Aktif Buero Basim Organisazyon, 1978. 312 pp.

Views the period 1923–49 as one during which the infrastructure of the economy was built up, and 1950–70 as one during which industrialization intensified. Argues that state socialism resulted from lack of private entrepreneurs.

15.55 Higgins, Benjamin and Higgins, Jean Downing. *Economic Development of a Small Planet.* New York, Norton, 1979. 292 pp.

The authors focus upon the global nature of the development problem and the environmental, physical, and human limitations to economic growth as a vehicle of development. They argue that Western formulae for development have failed.

15.56 Ho, Samuel P.S. *Economic Development of Taiwan, 1860–1970.* New Haven, Yale University Press, 1978. 461 pp.

Describes Taiwan's economic development with particular attention to agriculture and to the social equity aspects of pertinent government policies.

15.57 Jameson, Kenneth P. and Wilber, Charles K., eds. *Directions in Economic Development.* Notre Dame, University of Notre Dame Press, 1979. 256 pp.

Essays analyzing rates of return on capital in developed and developing countries; the basic needs approach to development; the center-periphery theory of development; and other topics.

15.58 Jerome, Robert T. *A Comparative Analysis of Growth in Bulgaria, Greece, and Yugoslavia, 1950–75.* Doctoral dissertation submitted to the University of Virginia, 1982. 228 pp.

Analyzes sources of growth in three semi-developed countries with greatly different institutions. Finds a downward trend in the contribution of factor productivity to growth in the centrally planned economies, as well as in the contribution of the reallocation of agricultural labor.

15.59 Joint Economic Committee, U.S. Congress *China Under the Four Modernizations,* Part 1, Selected Papers, August 13, 1982. Washington, U.S. Government Printing Office, 610 pp.

A collection of papers on Chinese economic growth and growth policy, industrial management, human resources, agriculture, science and technology, economic thought, and other topics. See index under "China" for individual papers.

15.60 Jorgenson, D.W. and Nishimizu, M. "U.S. and Japanese Economic Growth, 1952–1974: An International Comparison." *Economic Journal,* December 1978, pp. 707–726.

The authors analyze differences in output levels in terms of factor inputs and technology levels. They examine sources of economic growth in each country, finding that the gap between U.S. and Japanese technology was eliminated over the period covered.

15.61 Kadar, Bela. *Problems of Economic Growth in Latin America.* New York, St. Martin's Press, 1980. 267 pp.

Discusses the effects on agriculture and industry of the Pre-Columbian and colonial heritages in Latin America. Examines in particular the economies of Peru, Mexico, Argentina, Brazil, and Colombia.

15.62 Kahn, Herman. *World Economic Development: 1979 and Beyond.* Boulder, Westview Press, 1979. 519 pp.

After discussing historical trends as well as concepts of economic growth and cultural change, the author examines prospects over the period, 1979–2000. Suggests strategies for rapid worldwide economic growth.

15.63 Kim, Kwang Suk and Roemer, Michael. *Growth and Structural Transformation: Studies in the Modernization of the Republic of*

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Korea, 1945–75. Cambridge, Mass., Harvard University Press, 1979. 195 pp.

The authors present an overview of macroeconomic growth, describing policies and sources of economic growth. They also offer input-output analyses of sectoral growth and structural change in production.

15.64 Kuipers, S.K. and Lanjouw, G.J., eds. *Prospects of Economic Growth.* New York, North Holland, 1980. 287 pp.

A collection of papers examining changes in economic systems in Europe and their relation to economic growth; the connection between growth, resources, and technology; employment growth; and other topics. The authors take a generally pessimistic view of the likelihood of accelerated output and employment growth.

15.65 Kuo, Shirley W.Y. and others. *The Taiwan Success Story: Rapid Growth with Improved Distribution in the Republic of China* 1952–1979. Boulder, Colo., Westview Press, 1981. 161 pp.

The authors, viewing Taiwanese development as exemplifying how growth and equity may be complemented, discuss reasons for rapid industrialization, labor intensiveness, land reform and agricultural productivity, and stabilization policies.

15.66 Kuznets, Simon. "Driving Forces of Economic Growth: What Can We Learn from History?" *Weltwirtschaftliches Archiv,* 1980, pp. 409–431.

Reflects upon the economic growth record of the past 200 years. Gauges economic growth by the rise in the volume and diversity of final goods per capita. Comments on the way economic growth has been attained in various countries.

15.67 Kuznets, Simon. *Growth, Population, and Income Distribution.* Selected Essays. New York, Norton, 1979. 308 pp.

Examines, among other topics, the relation between economic growth and population and between growth and technical innovation.

15.68 Lardy, Nicholas. *Economic Growth and Distribution in China.* Cambridge, Cambridge University Press, 1978. 244 pp.

Examines the significance and impact of planning upon the economic growth of China, arguing that planning is superior to a market-oriented system. Finds regional industry shifts. Also discusses the tax system in terms of its control by central authority and, hence, as a central planning device, and as a means to reduce regional disparities.

15.69 Laumark, Sandra R. *The Developmental Effects of Health Care in Turkey.* Doctoral dissertation presented to the University of Pennsylvania, 1978. 384 pp.

Among other benefits, finds that improved health care service has resulted in higher productivity levels. Also suggests that a total health care system reduces the cost of health care, facilitates family planning, and induces attitudes favorable to economic development.

15.70 Lee, Eddy, ed. *Export-Led Industrialization and Development.* Geneva, International Labour Organization, 204 pp.

A collection of studies that find the high economic growth rates in Korea, Taiwan, Singapore, and Hong Kong to be the result of labor-intensive manufactured exports. Also notes reasons why countries such as the Philippines and Indonesia adopted similar growth policies.

15.71 McMains, Harvey and Wilcox, Lyle, eds. *Alternatives for Growth: The Engineering and Economics of Natural Resources Development.* Cambridge, Mass., Ballinger, 1978. 256 pp.

A collection of papers dealing with the relation between man and environment, energy technologies and the choices among them, the relation of governmental action to technological choice, and other topics.

15.72 MacEwan, Arthur. *Revolution and Economic Development in Cuba.* New York, St. Martin's Press, 1981. 265 pp.

Argues that the equalizing impact of early reforms under the Castro regime did not impair economic growth. Emphasizes improvement in agriculture, partially resulting from land reform, wage equalization, higher literacy, and other factors.

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15.73 Maitra, Priyatosh. *The Mainspring of Economic Development.* New York, St. Martin's Press, 1980, 162 pp.

Examines the bases of the industrial revolution in the 19th and 20th centuries. Deals with successful as well as unsuccessful cases of industrialization. Argues that success depends on developing indigenous technologies and making fundamental changes in the organization of agriculture.

15.74 Malinvaud, Edmond, ed. *Economic Growth and Resources.* Vol. 1: *The Major Issues: Proceedings of the Fifth World Congress of the International Economic Association* held in Tokyo, Japan. London, MacMillan, 1979, 278 pp.

A collection of essays discussing the rapid growth of capitalist countries in the post-World War II period, long-run movements in prices of exhaustible resources, the physical and social effects of economic growth, and other topics.

15.75 Mandl, Jay R. "Marxism and the Delayed Onset of Economic Development. A Reinterpretation." *Journal of Economic Issues,* September 1980, pp. 735–749.

Argues that Marx was overoptimistic in assuming the spread of economic development from capitalist dynamics (such as the incentive and capacity to innovate technologically). Shows the rise of market economies, unaccompanied by technological advance. Also notes that technological advance has occurred outside a capitalist framework.

15.76 Mathews, R.C.O. and others. *British Economic Growth, 1856–1973.* Stanford, Stanford University Press, 1982. 712 pp.

The authors explore the course and sources of British economic growth. They focus upon long-term trends and examine advances in total factor inputs and total factor productivity. They regard the high postwar growth rate as excessive.

15.77 Mathias, Peter and Postan, M.M., eds. *The Cambridge Economic History of Europe.* Vol. VII. *The Industrial Economies: Capital, Labour and Enterprise.* Part I, *Britain, France, Germany, and Scandinavia.* New York, Cambridge University Press, 1978. 832 pp.

A collection of essays discussing the relation between growth and the factors of production. Includes such topics as capital formation, labor, entrepreneurship, and management.

15.78 Mathias, Peter and Postan, M.M., eds. *The Cambridge Economic History of Europe.* Vol. VII. *The Industrial Economies: Capital, Labour and Enterprise.* Part 2. *The United States, Japan, and Russia.* New York, Cambridge University Press. 639 pp.

A collection of essays discussing capital formation, the evolution of enterprise, economic growth, and industrialization.

15.79 Mason, Edwin and others. *The Economic and Social Modernization of Korea.* Cambridge, Mass., Harvard University Press, 1980. 552 pp.

The authors review the historical record of Korea's economic growth, 1945–75, and the distribution of its fruits. They examine the importance of American assistance, and study the financial and fiscal systems, rural development, education, urbanization, and other aspects of growth.

15.80 Mesa-Lago, Carmelo. *The Economy of Socialist Cuba: A Two-Decade Appraisal.* Albuquerque, University of New Mexico Press, 1981. 235 pp.

Evaluates goals of Cuban economic development policies, including sustained economic growth, diversified production, external economic independence, and full employment. Finds that, while at first, productivity was subordinated to other goals, priority was assigned to raising productivity from the 1970's onward.

15.81 Murtaugh, Frank M. *Cavour and the Economic Modernization of the kingdom of Sardinia.* Doctoral dissertation submitted to Emory University, 1981. 344 pp.

Explores the economic reforms initiated by Cavour to lift Italy out of economic backwardness during the mid-19th century. Stresses reforms of the postal and fiscal systems, the modern financial system, theoretical bases underlying the reforms, and the adoption of free trade principles.

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15.82 Musson, A.E. *The Growth of British Industry.* New York, Holmes & Meier, 1978. 396 pp.

Discusses technological developments, industrial and business organization and structure, innovation, capital investment, and other aspects of growth. Covers the period 1500 to 1939.

15.83 Nakamura, Takafusa. *The Postwar Japanese Economy: Its Development and Structure.* Tokyo, Japan, Tokyo University Press (Columbia University Press, New York), 1981. 277 pp.

Covers the Japaness economy during and after World War II, exploring reasons for its rapid growth in terms of fiscal and monetary policy, and structural changes in the areas of small business, labor, and agriculture. Discusses why conditions favorable to rapid growth eroded after 1970.

15.84 Nishimizu, M. and Hulten, C.R. "The Sources of Japanese Economic Growth, 1955-71." *Review of Economics and Statistics,* August 1978, pp. 351-361.

The authors find that capital and intermediate inputs predominantly account for sectoral growth. They present a macro measure of total factor productivity.

15.85 O'Brien, Patrick and Keyder, Caglar. *Economic Growth in Britain and France 1780-1914: Two Paths to the Twentieth Century.* Boston, Allen & Unwin, 1978. 205 pp.

The authors offer measures of welfare for Britian and France and discuss reasons for the small gap in per capita incomes. They also measure and compare productivity trends, finding higher industrial productivity in France until 1890, but lower agricultural productivity. They argue that the French were more reluctant to industrialize than the English.

15.86 Odagiri, Hiroyuki. *The Theory of Growth in a Corporate Economy: Management Preference, Research and Development, and Economic Growth.* New York, Cambridge University Press, 1981. 220 pp.

Analyzes an economy consisting of large firms. Constructs a model synthesizing aspects of other models, and compares differences in growth rates between the United States and Japan. Finds that an increase in the rate of money supply adversely affects growth rates in national income and productivity.

15.87 Oman, Charles P. *The Formation of Capitalist Society in Peru: "Dualism" and Underdevelopment.* Doctoral dissertation presented to the University of California, Berkeley, 1978. 347 pp.

Argues that economic development is not synonymous with the development of a capitalist society. Analyzes the Peruvian economy and its historical roots, including nonmarket relations. Covers the Spanish colonial period, the period to 1880, and developments since then. Explores reasons for underdevelopment and dualism.

15.88 Petersen, Hans-Georg. "Size of the Public Sector, Economic Growth, and the Informal Economy: Development Trends in the Federal Republic of Germany." *The Review of Income and Wealth,* June 1982, pp. 191-216.

Discusses the structure of public expenditures and taxes, analyzing their impact on economic growth. Considers the probability of a shift of resources to the "informal" sector, rather than retardation of growth, from that impact.

15.89 Rawski, Thomas G. *China's Transition to Industrialism: Producer Goods and Economic Development in the Twentieth Century.* Ann Arbor, University of Michigan Press, 1980. 211 pp.

Demonstrates that strong growth characterized the producer goods sector of China's economy in the 1950's and 1960's. Argues that technologies were introduced so as to enable workers and managers to learn by doing. Asserts that central planning was pursued weakly and inconsistently.

15.90 Ray, Rajat K. *Industrialization in India: Growth and Conflict in the Private Corporate Sector, 1914-1947.* Delhi, India, Oxford University Press, 1979. 384 pp.

Examines reasons for the failure of private business enterprise in India to transform the economy from a predominantly agricultural one to a industrial one. Cites among reasons, reduced profit incentives stemming from limited market size and a backward technology.

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15.91 Reynolds, Lloyd G. "Economic Development in Historical Perspective." *American Economic Review*, May 1980, pp. 91–95.

Argues that growth acceleration in third-world countries has generally begun earlier than usually assumed. This holds particularly for countries where growth acceleration began after World War II. Notes the link between the growth of advanced and developing countries.

15.92 Rostow, W.W. *Why the Poor Get Richer and the Rich Slow Down: Essays in the Marshallian Long Period.* Austin, University of Texas Press, 1980. 376 pp.

A collection of essays on economic growth since the late 18th century, amplifying a theme first developed by Kondratieff that long waves last approximately 50 years.

15.93 Sachs, Ignacy. *Studies in Political Economy of Development.* New York, Pergamon Press, 1980. 316 pp.

Argues that there is a need for a political approach to economic development. Deals with long-term planning, investment, rates of growth, technology transfer, and other factors in development.

15.94 Samhan, Muhammed H. *The Role of the State in the Economic Development of Egypt.* Doctoral dissertation submitted to The American University, 1982. 465 pp.

Investigates the determinants of Egypt's economic development policies under various regimes, and the effects of these policies upon capital accumulation. Finds that internal class relations as well as foreign capital and intervention were determinants of these policies.

15.95 Sandberg, L.G. "Banking and Economic Growth in Sweden before World War I." *Journal of Economic History*, September 1978, pp. 650–680.

Finds a close association between Sweden's industrialization and an efficient banking industry. Attributes the efficiency of banking to the high literacy and educational level of the population.

15.96 Sarkisyants, G.S. ed. *Soviet Economy: Results and Prospects.* Moscow, U.S.S.R., Progress (Imported Publications, Chicago), 1980. 334 pp.

The authors describe the development of the Soviet economy, stressing its growth since 1979; emphasizes the role of planning.

15.97 Schwartz, Gail and Choate, Pat. *Being Number One: Rebuilding the U.S. Economy.* Lexington, Mass., Heath, 1980. 132 pp.

The authors discuss productivity and technological lags, the declining steel industry, and other sectoral problems. They recommend sector-specific strategies, and suggest government involvement.

15.98 Sherry, Robert L. *Petty Bourgeois Agriculture in the 19th Century United States.* Doctoral dissertation presented to Yale University, 1979. 310 pp.

Argues that 19th century farming contributed to economic growth. Shows such farms were enterprises dependent on their own labor, but seized markets for the produce developed. Analyzes the evolution of these markets. Discusses reasons for the decline of labor-based petty-bourgeois farming.

15.99 Shue, Vivienne. *Peasant China in Transition: The Dynamics of Development Toward Socialism.* Berkeley, University of California Press, 1980. 394 pp.

Describes collectivization of agriculture as the final outcome of redistributive tax policy, mutual aid teams, marketing and credit co-ops, and other factors. Argues that the success of these policies is shown by high rates of increase in farm output and income.

15.100 Simon, Richard M. *The Development of Underdevelopment: The Coal Industry and Its Effects on the West Virginia Economy, 1880–1930.* Doctoral dissertation presented to the University of Pittsburgh, 1978. 506 pp.

Investigates reasons why the rise of the coal industry did not stimulate more economic growth in West Virginia. Finds that despite rising per-capita income, self-sustained growth was not achieved because of the industry's impact on occupational structure, labor force participation, capital accumulation, State revenues and expenditures, and the business climate generally.

15.101 Singer, Morris. *Economic Development in the Context of Short-Term Public Policies: The Economic Advance of Turkey, 1938–1960.*

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Ankara, Turkish Economic Society, 1978. 522 pp.

Examines the industrialization policies of the 1940's and agricultural policies of the 1950's. Argues that the government failed at long-term planning in responding to short-term pressures.

15.102 Stafford, G.B. *The End of Economic Growth? Growth and Decline in the U.K. since 1945.* Totowa, N.J., Biblio Distribution Center, 1981. 124 pp.

Examines alternative hypotheses on the decline of the British economy since World War II. Argues that slow growth has not been due to inefficiency. Favors increases in final demand and restructuring of manufacturing production to spur exports.

15.103 Steindl, Josef. "Ideas and Concepts of Long Run Growth." *Banca Nazionale Del Lavoro Quarterly Review*, March 1981, pp. 35–48.

Discusses post-World War II theories of growth and technical progress, particularly Harrod's and Kalecki's. Contrasts these authors' ideas with von Neumann's.

15.104 Streissler, E. "Growth Models as Diffusion Processes: II. Empirical Illustrations." *Kyklos*, 1979, 32(3), pp. 571–586.

Argues that the classical model of country-specific growth rates holds, and that no evidence for the neoclassical model of a world-wide growth rate exists. Shows that latecomers generate higher growth rates than countries that had developed their economies earlier.

15.105 Swift, Jeanine. *Economic Development in Latin America.* New York, St. Martin's Press, 1978. 154 pp.

Argues that development issues are rooted in given historical and institutional settings. Examines reasons why at times growth is distorted or aborted. Discusses various growth models, as well as the role of multinationals, appropriate technology, employment, and other topics.

15.106 Tamor, Kenneth L. *The International Determinants of Industrial Growth.* Doctoral dissertation submitted to the University of California, Los Angeles, 1981. 172 pp.

Argues that the forces making for world-wide industrial growth are in flux, and that domestic management or regulatory factors cannot explain the impact on domestic production of international specialization. Examines the American steel industry in testing the argument.

15.107 Taylor, Kit Sims. *Sugar and the Underdevelopment of Northeastern Brazil, 1500–1970.* Gainesville, University Presses of Florida, 1978. 167 pp.

Examines the history and economics of the sugar industry, focusing on the role of the great estates and their influence on economic and political institutions. Argues that the monoculture of sugar inhibited the region's industrial development.

15.108 Taylor, Lance and others. *Models of Growth and Distribution for Brazil.* New York, Oxford University Press, 1980. 355 pp.

The authors address the question whether distributional inequality unavoidably accompanied economic growth in the 1960's. They evaluate economic developments in that decade and the 1970's, and analyze investment and wage policies and their determinants.

15.109 Teferra, Daniel. *The Phenomenon of Underdevelopment in Ethiopia.* Doctoral dissertation presented to the University of Wisconsin, Madison, 1979. 287 pp.

Argues that the process of underdevelopment in Ethiopia has resulted primarily from the internal class structure and patterns of surplus appropriation, which failed to lead to capital accumulation and technical advancement. Notes the uses of wealth by the imperial rulers and their associates.

15.110 Tsantis, Andreas C. and Pepper, Roy. *Romania: The Industrialization of an Agrarian Economy under Socialist Planning.* Report of a mission sent to Romania by the World Bank. Baltimore, Johns Hopkins University Press, 1979, 707 pp.

The authors describe the organization of the Romanian economy and assess and review its achievements, 1950–75. They also discuss prospects for the following decade, paying particular attention to the central plan, and management.

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15.111 Wereko, Theophilus B. *The Impact of the Textile Industry on Economic Growth: Comparative Productivity Analysis of the Textile Industry of Ghana, Colombia, Hong Kong and Japan, 1963–74.* Doctoral dissertation presented to the University of Pittsburgh, 1979. 365 pp.

Correlates textile industry variables with indicators of economic growth. Examines the contribution of the industry to the economy in terms of national account data, and the impact of textile productivity on the various economies.

15.112 The World Bank. *World Development Report, 1980.* New York, Oxford University Press, 1980. 166 pp.

Examines economic policy choices of developed and developing nations. Presents growth estimates. Analyzes various basic issues, including capital flows. Stresses the relation between economic growth and human development.

15.113 World Bank. *World Development Report, 1981.* New York, Oxford University Press, 1981. 192 pp.

Examines past trends and prospects for capital flows, trade, energy, and other developments affecting industrializing countries. Argues that income differentials between these and the developed countries will widen in the 1980's.

15.114 Worm, Kirsten, ed. *Industrialization, Development, and the Demands for a New International Economic Order.* Copenhagen, Samfundsvidenskabeligt Forlag, 1978.

The authors offer analyses of the process of industrialization and patterns of development in developing countries in a historical context. They discuss world labor markets, industrial siting, the international patent system, and foreign investment, among other topics.

15.115 Wu, Yuan-Li and Yeh, Kung-Chia, eds. *Growth, Distribution and Social Change: Essays on the Economy of the Republic of China.* Baltimore, University of Maryland, 1978. 227 pp.

A collection of essays discussing the sources of Taiwan's economic growth since the 1950's, its changing income distribution, development strategies pertaining to agriculture, industrialization, and other topics.

15.116 Yoshihara, Kunio. *Japanese Economic Development: A Short Introduction.* New York, Oxford University Press, 1979. 153 pp.

Focusses on Japanese "preparedness" for economic development, institutional reforms, and the impact of trade. Also discusses negative aspects. Questions the applicability of the Japanese development "model" to developing countries.

15.117 Zakeski, Eugene. *Stalinist Planning for Economic Growth, 1933–1952.* Chapel Hill, University of North Carolina Press, 1980. 788 pp.

Argues that the Soviet national plan is a "vision of growth," having strong ideological undertones, rather than an actual plan. Holds that the plan allocates resources and tasks through the bureaucratic hierarchy to enterprise unit, and that management, not planning, represents the dominant feature of the Soviet economy.

15.118 Zuverkas, Clarence. *Economic Development: An Introduction.* New York, St. Martin's Press, 1979. 433 pp.

After examining some of the obstacles to economic development, the author discusses population growth, trade and development, and the role of government. Also deals with the limits of growth controversy and presents empirical findings.

Other variables

16.1 Abramovitz, Moses. "Welfare Quandaries and Productivity Concerns." *American Economic Review,* March 1981, pp. 1–17.

Explores reasons why role of government in ensuring welfare has come increasingly under attack. Notes the productivity-enhancing aspects of that role. Discusses reasons for slowed productivity advances, and prospects for renewed growth.

16.2 Allen, Julius W. "Increasing Productivity in the United States: Ways in Which the Private and Public Sectors Can Contribute to Productivity Improvement." In *Productivity: The Foundation of Growth. Special Study on*

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Economic Change, Vol. 10. Joint Economic Committee, U.S. Congress, December 29, 1980. Washington, U.S. Government Printing Office, pp.67–100.

Reviews concepts of, and factors influencing, productivity. Discusses motivation, quality of working life, improved communication, incentives for research and development and to increase capital formation, assistance to small business, more support of education and vocational training, and reducing crime.

16.3 Alperovitz, Gar. "The Issue of Long Term Stability. Asking the Tough Questions about Industrial Policy and Reindustrialization." Testimony. In *Capital Formation and Industrial Policy. A Compendium of Papers and Reports Presented to the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce*, U.S. House of Representatives, July 1981. Washington, U.S. Government Printing Office, pp. 1–51.

In discussing the issues underlying economic problems and problems of economic policy, the author argues that economic instability has been at the root of slowed productivity growth, and that appropriate stabilization policies are needed to spur productivity.

16.4 Auer, Ludwig, *Regional Disparities of Productivity and Growth in Canada*. Hull, Quebec, Economic Council of Canada, 1979. 200 pp.

Focusses on factors accounting for variations in productivity performance. Analyzes the effect of industry structure, labor quality, capital per worker and technology. Finds that differences in provincial productivity arise mostly from variations in output per worker by industry, rather than from differences in industrial structure.

16.5 Babe, Robert E. "Vertical Integration and Productivity: Canadian Telecommunications." *Journal of Economic Issues*, March 1981, pp. 1–31.

Discusses the impact of telephone company ownership of equipment manufacturing on telecommunications productivity. Compares integrated and nonintegrated telephone companies, presenting productivity measures. Finds that productivity rises more rapidly in nonintegrated than in integrated firms.

16.6 Baranson, Jack. *The Japanese Challenge to U.S. Industry*. Lexington, Mass., Heath, 1981. 188 pp.

Focussing on consumer electronics, the author explores reasons for Japan's comparative success in competing with the United States. Points to long-range planning, technological vision, and willingness to take risks as chief factors in this success, as well as adaptability to technological change.

16.7 Bauer, Tamas and Soos, Karoly A. "Interfirm Relations and Technological Change in Eastern Europe—The Case of the Hungarian Motor Industry." *Acta Oeconomica*, 1979 23, pp. 285–303.

The authors argue that technological progress is impeded by the direct control exercised by government organs over interfirm relations, and by large firms' abuse of their monopoly positions by producing inferior goods.

16.8 Berry, R. Albert and Cline, William R. *Agrarian Structure and Productivity in Developing Countries*. A Study Prepared for the International Labour Office within the Framework of the World Employment Programme. Baltimore, Johns Hopkins University Press, 1979. 248 pp.

The authors examine the relation between farm size and factor productivity. They review pertinent theories, explore the effects of agricultural structure on productivity in a number of countries, and find higher land productivity on small farms than on large farms, and comparable factor productivities.

16.9 Birla Institute of Scientific Research, Economic Research Division. *Structural transformation and Economic Development*. New Delhi, Arnold-Heinemann, 1980. 125 pp.

The authors explore the themes suggested by the title, with particular attention to India. They discuss the historical shift from primary to secondary sectors and examine the output structure of eight Asian countries.

16.10 Blackaby, Frank, ed. *De-Industrialization*. London, Heinemann, 1979. 275 pp.

A collection of conference papers covering the trend toward a possible contraction in British manufacturing. Subjects discussed include current trends, the United Kingdom's

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falling share in world manufacturing, the lack of technical innovation and inadequate management, and nonprice factors in manufacturing's decline.

16.11 Bluestone, Barry, and Harrison, Bennett. *Capital and Communities: The Causes and Consequences of Private Disinvestment.* Washington, The Progressive Alliance, 1980. 334 pp. + appendix.

The authors discuss capital mobility in terms of its effects on regional and urban private investment and employment. They explore the reasons why capital moves, and critically evaluate explanations for the location of plants.

16.12 Bluestone, Barry and Harrison, Bennett. *The De-Industrialization of America: Plant Closings, Community Abandonment, and the Dismantling of Basic Industry.* New York, Basic Books, 1982. 323 pp.

Focusing upon private investment and disinvestment, the authors examine what they term the "hypermobility of capital," with managers shifting resources rapidly to maximize profit. They argue that this policy is destructive to social productivity, jobs, income, and political stability. They contend that raising productivity requires a higher social wage, more worker and community ownership, and other steps.

16.13 Boskin, Michael J., ed. *The Economy in the 1980's: A program for Growth and Stability.* New Brunswick, N.J., Transaction Books, 1980. 462 pp.

The authors analyze a range of subjects dealing with the importance of productivity in economic growth, as well as with other pertinent factors, in the American economy in the 1970's.

16.14 Britton, John N.H. and Gilmour, James M. *The Weakest Link: A Technological Perspective on Canadian Industrial Underdevelopment.* Ottawa, Science Council of Canada, 1978. 215 pp.

The authors examine the links between the primary, manufacturing, and service sectors of the Canadian economy. They evaluate industrial and technological policy responses to the behavior of foreign-owned firms. They view these firms' interest to be out of harmony with Canada's and stress the need for domestic technological and innovative capabilities.

16.15 Cave, Martin. *Computers and Economic Planning: The Soviet Experience.* New York, Cambridge University Press, 1980. 224 pp.

Describes how computers are applied in the Soviet planning process, and discusses their impact. Examines the history of this effort. Finds that the computer plays a role in automating certain management processes.

16.16 Cobb, James C. *The Selling of The South: The Southern Crusade for Industrial Development, 1936–1980.* Baton Rouge, Louisiana State University Press, 1982. 293 pp.

Traces the evolution of industrial expansion in 13 southern States. Investigates its economic and political impact, arguing that the expansion entrenched existing conservative forces. Finds that emphasis on cheap labor and low taxes helped perpetuate less favorable living conditions in the South.

16.17 Eads, George and McClain, David. "The Role of Govenment Policy in Productivity." In *Dimensions of Productivity Research, Proceedings of the Conference on Productivity Research.* The American Productivity Center, Houston, Texas, April 21–24, pp. 41–51.

The authors discuss some sources of the slowdown in productivity growth during the 1970's and implications for government policy. They stress the improvement of the investment climate, regulatory reform, support of R&D efforts, and other factors.

16.18 Folbre, Nancy R. *Patriarchy and Capitalism in New England, 1620–1900.* Doctoral dissertation presented to the University of Massachusetts, 1979. 218 pp.

Argues that exploitation is a subset of political control. Holds that there is an intensification of control over children and childbearing, but that, as capitalism expands, control over children and women diminishes. Also discusses certain modifications of capital accumulation resulting from patriarchy.

16.19 Friedmann, Karen J. "Bureaucracy, Land Reform, and Technological Progress: Denmark, 1755–1810." *Food Research Institute Studies, 1979,* pp. 219–234.

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Traces the impact upon farm technology of the end of the manorial system in Denmark resulting from agricultural reforms. Argues that an enlightened bureaucracy has made effective advances in farm productivity.

16.20 Gilder, George. *Wealth and Poverty.* New York, Basic Books, 1981. 306 pp.

Discusses the role of government in fostering or retarding economic growth. Argues in favor of rewards to spur work, investment, and risk-taking. Considers such subjects as discrimination, employment, and productivity.

16.21 Gold, Bela. "Changing Perspectives on Size, Scale, and Returns: An Interpretive Survey." *Journal of Economic Literature,* March 1981, pp. 5-33.

Outlines the history of thought pertaining to scale and the conditions of scale increases. Finds a paucity of conventional economic theory in regard to scale and notes some shortcomings of empirical research. Outlines field research perspectives on improving appraisals of scale economies.

16.22 Gran, Peter. *Islamic Roots of Capitalism: Egypt, 1760-1840.* Austin, University of Texas Press, 1979. 278 pp.

Argues that indigenous roots for a capitalist culture existed in 18th century Egypt, but that development was disrupted by Western-dominated world markets. Describes capitalist transformation effected by merchants and the government bureaucracy. Traces links to the social transformations in the West, as well as to Islamic cultural revival.

16.23 Grant, Wyn. *The Polictical Economy of Industrial Policy.* Boston, Butterworths, 1982. 160 pp.

Focuses on attempts of British Governments between 1972 and 1979 to influence private investment. Examines the National Enterprise Board as the state holding company model. Discusses interest groups and firms with influence on industrial policy.

16.24 Halliday, Jon. *A Political History of Japanese Capitalism.* New York, Monthly Review Press, 1978. 466 pp.

Focuses on class structure and conflict, modes of production, and ideology. Discusses the relationship of Japanese capitalism to the global economic system.

16.25 Harris, Louis and Etzioni, Amitai. *Perspectives on Productivity. A Global View.* Stevens Point, Wis., Sentry Insurance, 1981. 59 pp.

The authors, summarizing results from a survey of opinion in the United States, United Kingdom, West Germany, Australia, and Japan, find Americans to be receptive to measures designed to raise productivity (e.g., investment stimulation and decreased government spending). At the same time they blame labor unions for much of the productivity problem.

16.26 Held, Joseph, ed. *The Modernization of Agriculture: Rural Transformation in Hungary, 1848-1975.* New York, Columbia University Press, 1980. 508 pp.

A collection of research papers, essentially showing that modernization did not begin prior to 1945. Among subjects discussed is the collectivization of Hungarian agriculture, attempts to resolve the incentive problem (believed to have been overcome by freeing the price system after 1968), and restructuring (i.e., simplifying, collectivization in terms of different agricultural processes).

16.27 Heywood, Colin M. "The Role of the Peasantry in French Industrialization, 1815-1880." *Economic History Review,* August 1981, pp. 359-376.

Casts doubt upon the conventional view that subdivision of properties, small farm size, and preindustrial values undermined French agricultural performance. Offers a model showing that the advanced sector tended to absorb the traditional sector, leaving the peasantry with a peripheral role.

16.28 Holloman, J. Herbert. "Policies and Programs of Governments Directed toward Industrial Innovation." In *Technological Innovation for a Dynamic Economy.* New York, Pergamon Press, 1979, pp. 292-317.

Discusses government's impact on innovation through the patent system, standards setting, direct intervention in the innovation process, and through regulation.

16.29 Howsen, Roy M. *Government Policies and Technological Adoption in the Domestic Steel*

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Industry. Doctoral dissertation presented to the University of Arkansas, 1980. 85 pp.

Estimates the industry's adoption of the open furnace process in the absence of government policies. Explores the impact of actual policies on such adoption, finding price controls, tariffs, and environmental controls to be the major policies affecting the industry's technology.

16.30 John Paul II, Pope. *On Human Work.* Encyclical "Laborem Exercens." *Origins.* North Carolina Documentary Service, September 24, 1981, pp. 225–244.

Discusses a large number of topics related to work, including technology, the conflict between labor and capital, the rights of workers, employment, unions, and agriculture.

16.31 Jones, E.L. *The European Miracle: Environments, Economies, and Geopolitics in the History of Europe and Asia.* New York, Cambridge University Press, 1981. 276 pp.

Explores reasons why industrialization occurred in Europe and not in Asia between 1400 and 1800. Argues that state action, in combination with individualized production and collective services, paved the way to modernization.

16.32 Jones, H.J. *Live Machines: Hired Foreigners and Meiji Japan.* Vancouver, University of British Columbia Press, 1980. 210 pp.

Examines Meiji maintenance of control over Japanese development efforts. Details the administrative history of regulating foreign workers needed for this effort. Assesses the impact of these workers on Japanese institutions.

16.33 Kendrick, John W. and Grossman, Elliot S. *Productivity in the United States: Trends and Cycles.* Baltimore, Johns Hopkins University Press, 1980. 172 pp.

The authors present annual and quarterly data for total factor productivity since 1948, analyzing long-term trends in such variables as unit costs, prices, profits, and cyclical behavior.

16.34 Koseoglu, Erol. *Industrial Structure Duality in Turkey.* Doctoral dissertation presented to the New School of Social Research, 1979. 86 pp.

After exploring the theory of dualism in its impact on theories of economic development, the author investigates the dualism between traditional and advanced capitalist sectors in Turkey. He explores reasons for the dualism within the capitalist sector by means of factor analysis.

16.35 Kriedte, Peter and others. *Industrialization Before Industrialization: Rural Industry in the Genesis of Capitalism.* New York, Cambridge University Press, 1981. 335 pp.

The authors explore the industrial development of rural areas during the transition to industrial capitalism, finding employment during this period to be dependent on mass production for interregional and international markets.

16.36 Kuisel, Richard F. *Capitalism and the State in Modern France: Renovation and Economic Management in the Twentieth Century.* New York, Cambridge University Press, 1981. 344 pp.

Examines changes in the French economy, 1900–1952, focusing upon the outlook of decision makers, the institutional framework, and public policy. Emphasizes pressures to catch up with other advanced nations and to attain stability, and a collective disenchantment with the liberal order, all providing the impetus for establishing a managed economy.

16.37 McNeill, William H. *The Metamorphosis of Greece since World War II.* Chicago, University of Chicago Press, 1978. 264 pp.

Explains fundamental economic and social change in terms of the interaction between new technical and market opportunities and traditional behavior largely shaped by market attitudes rooted in Greek rural life.

16.38 Marshall, Gordon. *In Search of the Spirit of Capitalism: An Essay on Max Weber's Protestant Ethic Thesis.* New York, Columbia University Press., 1982. 236 pp.

Examines the controversy around Max Weber's thesis. Discusses its origins and implications. Investigates the relation between the ethic of ascetic Protestantism and the mentality of the capitalist classes of early modern Europe.

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16.39 Moore Trescott, Martha. *The Rise of the American Electrochemicals Industry, 1880–1910.* Westport, Conn., Greenwood, 1981. 394 pp.

Examines why and how the electrochemicals industry became a leading sector in chemicals manufacture, how electrochemical theory affected it, and how it related to industrial development in the United States at large, including the drive toward mass production and the search for inexpensive means of production.

16.40 Morishima, Michio. *Why Has Japan Succeeded? Western Technology and the Japanese Ethos.* New York, Cambridge University Press, 1982. 207 pp.

Examines the background of Japan's capitalist development. Discusses the Meiji revolution, the influence of Japanese religious thought, and the introduction of western technology on Japanese economic growth.

16.41 Mueller, Hans and Kawahito, Kiyoshi. *Steel Industry Economics: A Comparative Analysis of Structure, Conduct and Performance.* New York, Japan Steel Information Center, 1978. 63 pp.

The author examined the characteristics of major steel firms, the steel import problem and the economics of steelmaking.

16.42 Nair, Kusum. *In Defense of the Irrational Peasant: Indian Agriculture after the Green Revolution.* Chicago, University of Chicago Press, 1979. 154 pp.

Describes the effects of the Green Revolution and its gradual demise. Examines cultural and other social characteristics to explain why it succeeded in some localities and failed in others. Presents case studies.

16.43 Neftici, Salih N. "The Asymmetric Behavior of Labor Productivity during the Business Cycle." In *Aggregate and Industry-Level Productivity Analyses.* Ali Dogramaci and Nabil R. Adam, eds., Boston, Martinus Nijhoff, 1981, pp. 77–89.

Investigates whether the decision rules used by individual firms to determine optimal employment levels depend on the stage of the business cycle.

16.45 Organization for Economic Cooperation and Development. *Interfutures: Research Project on The Future Development of Advanced Industrial Societies in Harmony with that of Developing Countries.* Final Report. Washington, OECD, 1979, 425 pp.

The authors analyze the prospects, constraints, and issues facing industrial countries in their own development as well as in their relations with the developing countries. They argue that political, economic, and social problems represent a greater challenge than physical limits.

16.46 O'Toole, James. *Making America work: Productivity and Responsibility.* New York, Continuum, 1981. 216 pp.

Argues that the problems of declining economic growth and productivity are in large part attributable to changes in social values. Presents case studies demonstrating the fusion of rights and responsibilities and its effects on productivity.

16.47 Pachis, Dimitrios S. *The History of the U.S. Trunk Airline Industry: The Conditions of Its Capital Accumulation, 1945–1975.* Doctoral dissertation submitted to the University of Massachusetts, 1982. 324 pp.

Examines aircraft technology, the airlines' market behavior, and financing methods as factors in the investment instability of the industry. Finds aircraft technologies essentially to have been molded by U.S. government action. Notes the oligopolistic structure of the industry, resulting in overcapacity and production inefficiencies.

16.48 Parry, T.G., ed. *Australian Industry Policy.* Melbourne, Longman Cheshire, 1982. 320 pp.

A collection of papers, discussing efficient resource use, allocation of resources within and between industries, technology, and other subjects.

16.49 Peacock, Alan T. *Structural Economic Policies in West Germany and the United Kingdon.* London, Anglo-German Foundation for the Study of Industrial Society, 1980. 128 pp.

After defining the nature and approaches to structural policies, the author discusses some of their applications, as in shipbuilding and computers. He points to the strategic and medium-term objectives of structural policies in Germany as they apply to entire sectors.

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He compares these to the more pragmatic approach found in Great Britain, often confined to individual firms.

16.50 Peebles, Malcolm W. *Evolution of the Gas Industry.* New York, New York University Press, 1980. 235 pp.

Deals with the transition from manufactured to natural gas in the United States, the United Kingdom, the Netherlands, Japan, and the Soviet Union. Notes the rapid conversion that occurred in Europe during the 1960's, and contrasts it with the slower evolution in the United States, and the impact of regulation. Also discusses the rise in importance of liquid natural gas imports, especially in Japan.

16.51 Pinder, John, ed. *National Industrial Strategies and the World Economy.* Totowa, N.J., Littlefield, Adams, 1982. 302 pp.

A collection of papers discussing adaptation of industries to structural changes arising from changes in the world economy. The discussions include the emergence of Japan and of newly industrializing countries; responses to recent developments in steel, aircraft, textiles, and shipbuilding; and future industrial policies in the United States, Canada, Japan, and in European countries.

16.52 Rees, John. "Government Policy and Industrial Location in the United States." In *State and Local Finance: Adjustments in a Changing Economy.* Special *Study on Economic Change,* Vol. 7. Joint Economic Committee, U.S. Congress, December 19, 1980. Washington, U.S. Government Printing Office, pp. 128–179.

Discusses structural changes in manufacturing, the growth of the manufacturing and service industries, and locational change in the context of government policy.

16.53 Reich, Robert B. "Making Industrial Policy." *Foreign Affairs,* Spring 1982, pp. 852–881.

After surveying sources of decline in productivity rates and exports, the author argues for a comprehensive program of "managed adjustment" that eschews protectionist devices. He holds that adjustments would emerge from the collaboration of government, business, and labor.

16.54 Rogers, Robert P. *The Development and Structure of the U.S. Electric Lamp Industry.* Staff Report of the Federal Trade Commission. Washington, U.S. Government Printing Office, 1980. 142 pp.

Reviewing the history of the industry, the author discusses structure, economies of scale, product differentiation, and innovation within the industry.

16.55 Rousseas, Stephen. *Capitalism and Catastrophe: A Critical Appraisal of the Limits to Capitalism.* New York, Cambridge University Press, 1939. 139 pp.

Examines certain neo-Marxist theories of advanced capitalism, particularly those of Jurgen Habermas and the Frankfurt School. Also examines theories of Rosa Luxemburg. Discusses the impact of the 1974 oil price hikes on the world capitalist system.

16.56 Ruttan, V.W. "Structural Retardation and the Modernization of French Agriculture: A Skeptical View." *Journal of Economic History,* September 1978, pp. 714–728.

Argues that reasons for the poor performance of French agriculture between the 1870's and the 1940's were rooted in the limited opportunities offered by the French economy at large. The slow expansion of the nonagricultural sector and inadequate investment in agricultural infrastructures were especially important in this regard.

16.57 Samuel, Howard D. "Trade and Productivity: Do They Relate?" In *Productivity: Prospects for Growth.* Jerome M. Rosow, ed. New York, Van Nostrand Reinhold, 1981, pp. 76–96.

Argues that free trade and the theory of comparative advantage may damage domestic industries and their ability to improve productivity as well as give rise to social inequities.

16.58 Scaperlands, Anthony. "Stagnation: The Central Problem." *Review of Social Economy,* December 1980, pp. 293–301.

Argues that prices play but a transitory role in retarding investment, and that it is lack of frontier stimuli, population growth slowdown, increased industry concentration, and low rates of invention that do so

16.59 Schultz, Theodore W., ed. *Distortions of Agricultural Incentives.* Bloomington, Indiana University Press, 1978. 343 pp.

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A collection of papers dealing with constraints to agricultural output, including public policies in developing countries (such as undervaluation of food). The authors argue for increased intervention by government in agricultural markets. They discuss pricing policies motivated by fiscal needs, unrecognized capital needs, and reasons for international price instability.

16.60 Solo, Robert. *Across the High Technology Threshold: The Case of Synthetic Rubber.* Norwood, Pa., Norwood Editions, 1980. 130 pp.

Describes the evolution of the government's synthetic rubber R & D and production program during World War II, and evaluates it as a near failure. Suggests the reasons for its lack of success arise from the self interests of private firms involved in the program and from the lack of coordination between technical and policy-making personnel within government.

16.61 Spearman, James E. *The Economics of the U.S. Metallurgical Coal Industry.* Doctoral dissertation presented to West Virginia University, 1978. 279 pp.

Explores similarities between different kinds and qualities of coals. Analyzes production and long-run capacity. Investigates resource adequacy and long-run price trends. Finds near perfect substitutability among high-volatile coals, but that only low- and medium-volatile coals should be classified as metallurgical.

16.62 Thurow, Lester C. *The Zero Sum Society: Distribution and the Possibilities for Economic Change.* New York, Penguin Books, 1981. 230 pp.

Analyzes reasons for the difficulties in solving such problems as inflation, slow economic growth, the proliferation of rules and regulations, and high costs of energy. Also discusses factors underlying the slowdown in productivity.

16.63 Tipton, Frank B. Jr. "Government Policy and Economic Development in Germany and Japan: A Skeptical Reevaluation." *Journal of Economic History.* March 1981, pp. 139–150.

Summarizing recent studies, the author argues that bureaucratic elites were less successful in stimulating economic growth in the 19th century than commonly supposed, causing their economies to be less adaptable to external events. Also questions development strategies based on central control.

16.64 Torres, Roman. *Structural Transformation in the Economy of Puerto Rico from 1940 to 1972: An Input-Output Analysis.* Doctoral dissertation presented to Michigan State University, 1979. 290 pp.

Describes the evolution of Puerto Rico from a colonial agricultural economy, focusing an effort toward self-sustained growth. Notes the stagnation since 1972, and investigates the structural changes underlying it. Finds economic development efforts to have succeeded, but also that the Puerto Rican economy is not self-sustaining.

16.65 Tung, Rosalie L. *Chinese Industrial Society After Mao.* Lexington, Mass., Heath, 1982. 357 pp.

Discusses the functioning of industrial enterprise after Mao. Deals with developments in science and technology, agriculture, industry, and defense. Also examines Chinese attitudes toward work and innovation, and the outlook for increased productivity.

16.66 Tuttle, William M. Jr. "The Birth of an Industry: The Synthetic Rubber 'Mess' in World War II." *Technology and Culture.* January 1981, pp. 35–67.

Describes the obstacles in the way of creating the synthetic rubber industry, including the rivalry between grain and petroleum interests, the fight over patents, and the difficulties of obtaining equipment and construction materials for building synthetic rubber plants. Also notes personal clashes that arose from different philosophies of government.

16.67 U.S. Senate, Committee on the Budget, Subcommittee on Industrial Growth and Productivity. *Industrial Growth and Productivity.* Hearings, Dec. 3 and 5, 1980; January 26–28, 1981. Washington, U.S. Government Printing Office, 1981. 319 pp.

Contains testimony by government and industry representatives on trends and prospects of the U.S. economy, science and technology policy and the electronics industry, impact of

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Federal policies in aiding problem industries, and the impact of international trade.

16.68 Wallerstein, Immanuel. *The Capitalist World Economy: Essays.* New York, Cambridge University Press, 1979. 305 pp.

Discusses such topics as the transition from feudalism, the phenomenon of dependence, class and conflict in contemporary Africa, and aspects of inequality.

16.69 Webb, S.B. "Tariffs, Cartels, Technology, and Growth in the German Steel Industry, 1979 to 1914." *Journal of Economic History,* June 1980, pp. 309–329.

Argues that restrictions in competition by tariffs and cartels may have contributed to productivity advances in the German steel industry by reducing the risks of capital-intensive technology.

16.70 Wiener, A. *Magnificent Myth: Patterns of Control in Post-Industrial Society.* New York, Pergamon Press, 1978. 413 pp.

Discusses innovations required to facilitate the rise of post-industrial societies to new levels of regulation and control. Argues that there is an imbalance of science, technology, and the ability to manipulate the biosphere, resulting in a need for control. Focusses on control mechanisms.

16.71 Williams, Rosalind. "Reindustrialization Past and Present." *Technology Review,* November/December 1982, pp. 48–57.

Reviews the ideas of Piotr Kropotkin on encountering the industrial decline of Great Britain in the last decades of the 19th century. Emphasizes Kropotkin's proposals for industries based on cooperation and self-management. Holds that technology approriate for such an economic structure exists and may be applied to current problems of reindustrialization in the United States.

16.72 Willis, Mark Alan. *The Effects of Cyclical Demand on Industry Structure and on the Rate of Technological Change: An International Comparison of the Housebuilding Sectors in the United States, Great Britain, and France.* Doctoral dissertation presented to Yale University, 1979.

Argues that cyclical swings in demand underlying lagging technological change in home construction, and its failure to become "industrialized." Discusses reasons for low R&D in the industry including fragmentation of the industry, nonspecialization of inputs and outputs, reluctance of builders to use processes with high setup costs, and low profits.

16.73 Wolfe, Alan. *America's Impasse: The Rise and Fall of the Politics of Growth.* New York, Random House, 1981. 293 pp.

Argues that the failure of party politics has led to a slowdown in economic growth. Traces the economic policies of the Reagan administration, noting the gap between the vitality of the economic system and an "emaciated" political system.

16.74 Wong, Christine P.W. *Rural Industrialization in China: Development of the Five Small Industries.* Doctoral dissertation presented to the University of California, Berkeley, 1979. 256 pp.

Discusses the rationale for the decentralization and spatial distribution of small-scale establishments in iron and steel, fertilizers, farm machinery, cement, and energy-producing industries. Funds transportation and administrative costs to be determinant of enterprise location within each industry.

16.75 Wright, J.F. *Britain in the Age of Economic Management: An Economic History since 1939.* New York, Oxford University Press, 1979. 196 pp.

Focusing on the role of government, the author provides data on the economic growth of Britain since before World War II, and discusses such factors as technology, business institutions, and productivity.

16.76 Zarnowitz, Victor. *Business Cycles and Growth: Some Reflections and Measures.* Working Paper No. 665. Cambridge, Mass., National Bureau of Economic Research, 1981.

Explains and analyses the differences between growth cycles and business cycles, the former representing deviations from long-term trends, the latter changes in level of economic activity. Classifies recent growth cycles.

16.77 Zucker, Seymour and others. *The Re-Industrialization of America.* New York, McGraw-Hill, 1982. 200 pp.

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The authors document the shrinking standard of living in the United States. They examine developments in such leading industries as consumer electronics, autos and steel, and loss in international competitiveness. They also explore certain strengths of the economy.

Bibliographies, annual reports, etc.

17.1 Byrne, Rusty Stieff. "Sources on Productivity." *Harvard Business Review*, September-October 1981, pp. 36 ff.

Provides a brief list of major articles and books on productivity and the productivity slowdown.

17.2 *Economic Report of the President.* Published annually together with *The Annual Report* of the Council of Economic Advisers. Washington, U.S. Government Printing Office.

Includes discussions of recent developments in productivity and their impact on the economy.

17.3 *Employment and Training Report of the President.* Washington, U.S. Government Printing Office. Published annually.

Includes a survey of recent developments in productivity. Discusses training activities sponsored by the Employment and Training Administration of the U.S. Department of Labor. Evaluates the effectiveness of these activities. Features extensive labor force and employment statistics.

17.4 Goodwin, Jack. "Current Bibliography in the History of Technology (1981)." *Technology and Culture*, April 1983, pp. 316–398. (See also issues of April 1982, pp. 282–340, and April 1981, pp. 374–484.)

17.5 Leff, Nathaniel H. "Entrepreneurship and Economic Development: The Problem Revisited." *Journal of Economic Literature*, March 1979, pp. 60–64.

Presents a selected bibliography on the subject covering the 1970's.

17.6 *Manufacturing Productivity Frontiers.* A monthly publication of the Manufacturing Productivity Center, IIT Center, Chicago, Illinois.

Presents articles on productivity improvement, stressing the role of management. Features notes brief reviews of books, and abstracts of pertinent publications.

17.7 *National Productivity Report.* 1110 Greenwood Road, Wheaton, Ill. 60187.

Published 24 times a year, the *Report* covers productivity improvement programs of individual firms, improvement of managerial and supervisory skills, employee motivation and participating, the uses of computers and other advanced technologies, and cost reduction efforts.

17.8 *National Productivity Review. The Journal of Productivity Management.* Published quarterly by Executive Enterprises Publications, New York, N.Y.

Publishes articles on a wide range of topics in productivity, such as measurement at the company level, and of specific functions, such as white-collar work; capital productivity; productivity bargaining; productivity improvement at the company and industry levels; public-sector productivity; work quality circles; technological factors; and worklife quality.

17.9 *Office Productivity: A Monthly Update.* Hinsdale, Ill., CDM Publishing Co Four pages per issue.

Presents news pertaining to productivity-improving office equipment and design, summaries of studies pertaining to training, effects of efforts to improve office productivity, motivational issues, and other relevant topics.

17.10 *The Productivity Letter.* Published bimonthly by the American Productivity Center, Houston, Texas.

Features brief items on topics in productivity and factors affecting levels of company and industry productivity. Also discusses public policies affecting productivity.

17.11 Sagafi-Nejad, Tagi and Belfield, Rober. *Transnational Corporations, Technology Transfer, and Development: A Bibliographic Sourcebook.* New York, Pergamon Press, 1980. 145 pp.

Lists publications on such subjects as historical and current studies on science and technology, and their role in development; micro-

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economic analyses of corporate technology transfer; and the regulation and control of technology transfer.

17.12 *Survey of Current Business.* A monthly publication of the U.S. Department of Commerce.

Includes quarterly surveys of plant and equipment expenditures, as well as periodic discussions of capital and other expenditures for pollution abatement.

17.13 U.S. Department of Labor, Bureau of Labor Statistics. *BLS Handbook of Methods. Vol. 1.* Bulletin 2134–1. Washington, U.S. Government Printing Office, December 1982, 153 pp.

Includes descriptions of BLS productivity and unit cost measures, data sources and estimating procedures, calculation procedures, and uses and limitations. Also describes technological studies, and their sources, methods of collecting technological information and concepts used in interpreting technological change. Discusses scope and sources of foreign labor statistics used in international comparisons. Features lists of technical reference materials.

17.14 U.S. Department of Labor, Bureau of Labor Statistics. *BLS Publications on Productivity and Technology.* Report 671. October 1982. 25 pp.

Lists studies of productivity, technology, international comparisons, and construction requirements done by the BLS Office of Productivity and Technology over the previous decade.

17.15 U.S. Department of Labor, Bureau of Labor Statistics. *Employment and Earnings.* Washington, U.S Government Printing Office.

Monthly publication featuring household data on the labor force, total employment, and unemployment; jobseeking methods used by the unemployed; establishment data on employment, hours, earnings, and turnover; output per hour, hourly compensation, and unit labor costs; insured unemployment; and special articles reviewing data on pertinent subjects.

17.16 U.S. Department of Labor, Bureau of Labor Statistics. *Monthly Labor Review.* Washington, U.S. Government Printing Office.

Regularly publishes original articles on concepts, trends, and the sources of productivity change, as well as on construction labor requirements and related subjects. Also lists new publications on productivity each month.

17.17 U.S. Department of Labor, Bureau of Labor Statistics. *Productivity and the Economy: A Chartbook.* Bulletin 2084. Washington, U.S. Government Printing Office, October 1981. 104 pp.

Presents charts, accompanied by explanatory text and tables. Covers trends in labor and multifactor productivity and underlying forces. Includes information on costs and prices, technological change, research and development, international comparisons, and other topics.

17.18 U.S. Department of Labor, Bureau of Labor Statistics. *Productivity Measures for Selected Industries, 1954–81.* Bulletin 2155. Washington, U.S. Government Printing Office. December 1982. 246 pp.

Published annually, this compendium presents measures of labor productivity and related variables, together with charts, for a broad range of industries in mining, manufacturing, transportation, trade, finance, and services.

17.19 U.S. Department of Labor, Bureau of Labor Statistics. *Productivity: A Selected, Annotated Bibliography, 1976–78.* Bulletin 2051. Washington, U.S. Government Printing Office, April 1980. 166 pp.

Provides references for 1,000 publications dealing with concepts and methods, measurements of levels and trends, the sources of productivity change, and the relation of productivity to the economy as a whole and to economic variables such as wages and prices.

17.20 U.S. Department of Labor, Employment and Training Administration. *Research and Development Projects.* 1980 edition. Washington, 1980. 221 pp.

The tenth annual edition, this publication lists and summarizes projects funded by the ETA's Office of Research and Development Between Oct. 1, 1977 and Sept. 30, 1980, as well as older but still "active" projects. Fields covered include programs and techniques in education, training and apprenticeship, up-

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grading and job restructuring, worker attitudes, the labor market, and others.

17.21 *World of Work Report.* An international report published monthly by Work in America Institute, Inc., N.Y.

Covers new trends, experiments, and developments in the workplace, focusing on efferts to improve performance and productivity. Also analyses current experience, contemporary issues, and new ideas.

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